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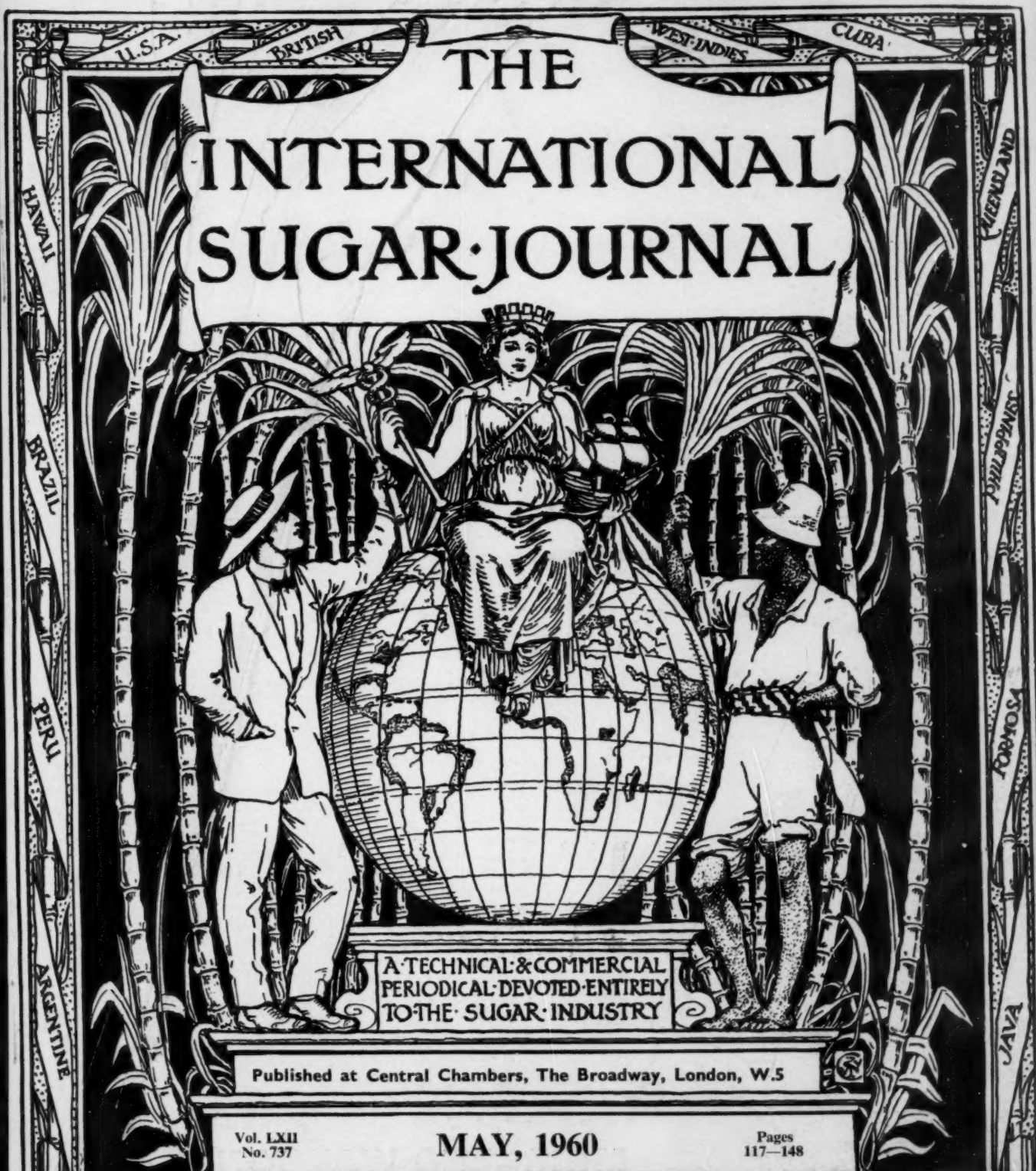

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MAY, 1960

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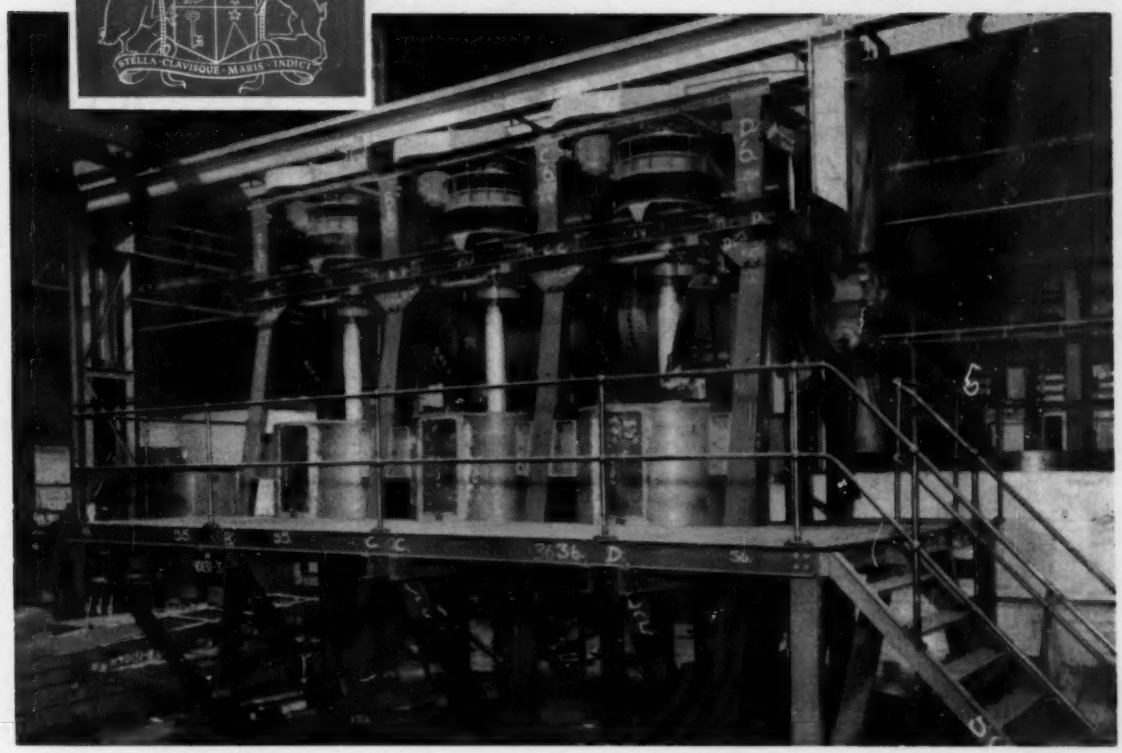

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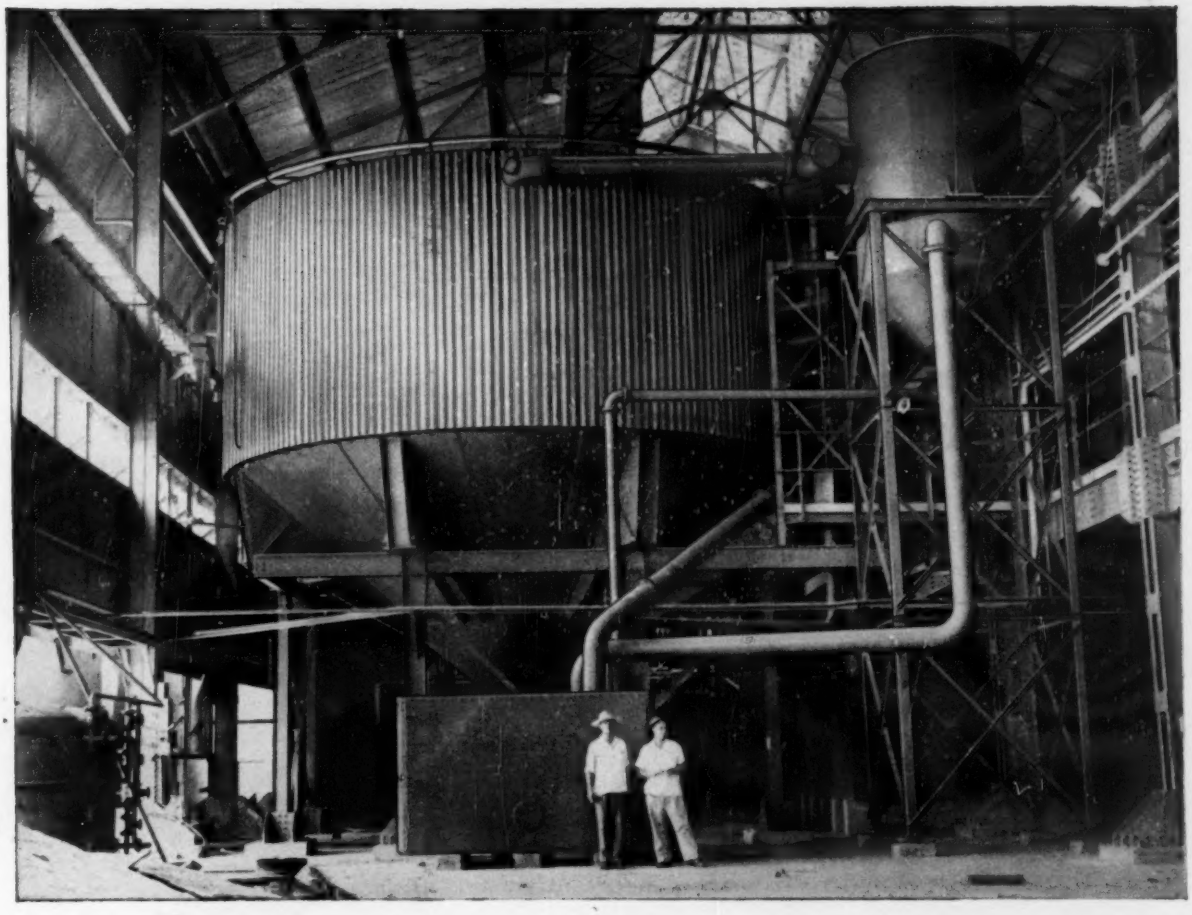

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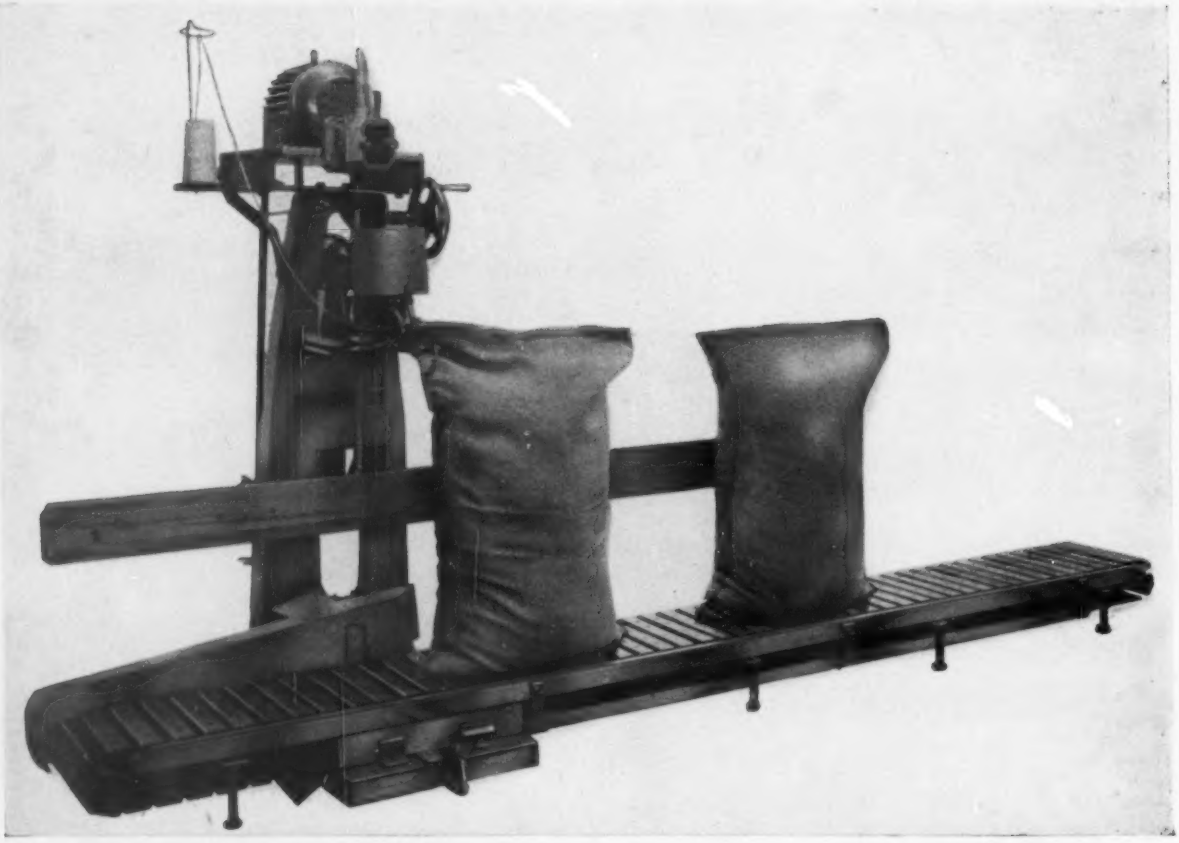

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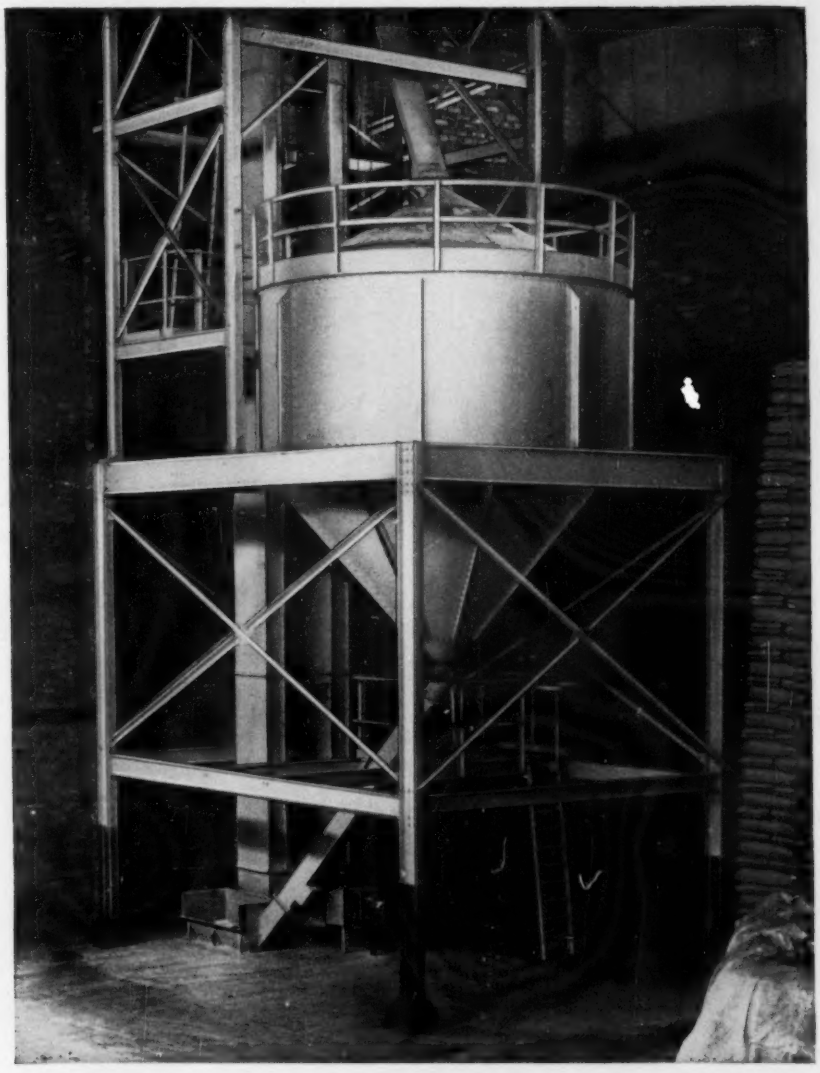

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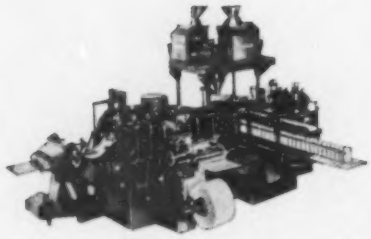
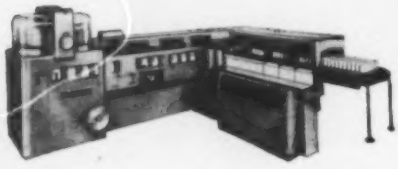


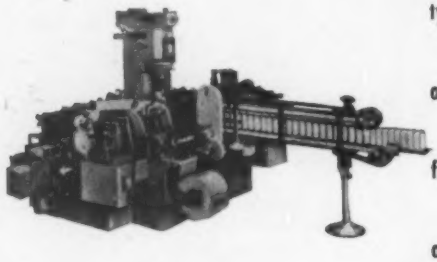
for granulated sugar

type of package: double-walled bag
size: up to about 7 lbs.
operation: fully automatic, inner paper fed from reel, outer paper from magazine, or from pre-printed reel, or being printed in up to 3 colors in the machine
operating speed: up to about 80 packages per minute



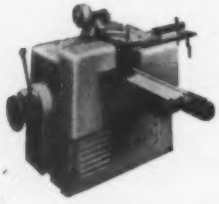
high speed packaging machine

type of package: single carton
size: up to about 5 lbs.
operation: fully automatic, set-up cartons which are glued at long-seam are fed from magazine, opened, glued at the bottom, filled and closed at the top
operating speed: up to 250 packages per minute



for powdered sugar

type of package: inner bag (glued or heat sealed or fin-sealed) and outer carton
operation: fully automatic, inner liner fed from reel, printed die-cut carton fed from magazine
filling arrangement: auger filler, possibly with electronic weight regulation
operating speed: up to 80 packages per minute



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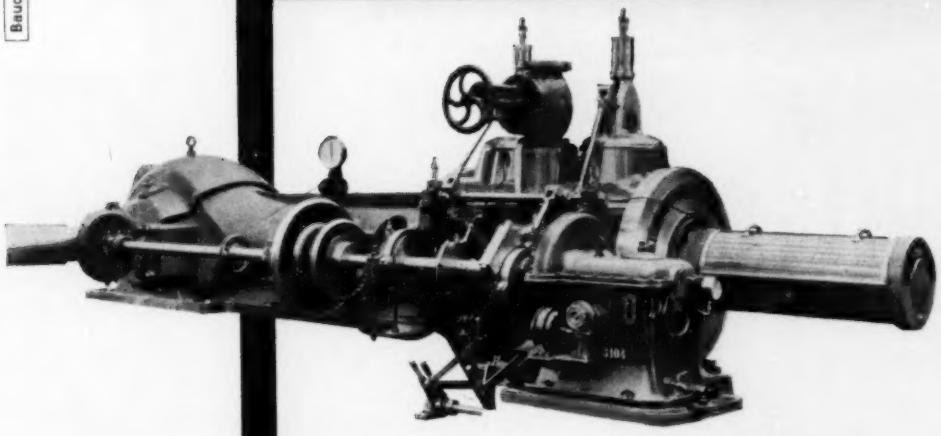

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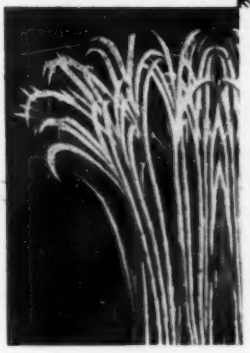

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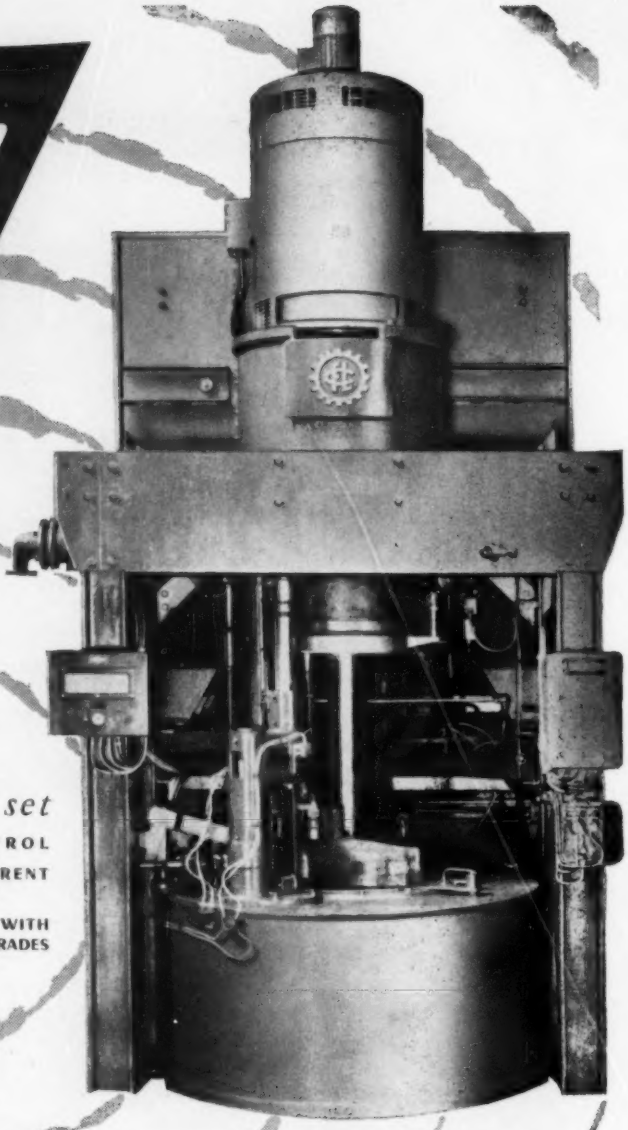

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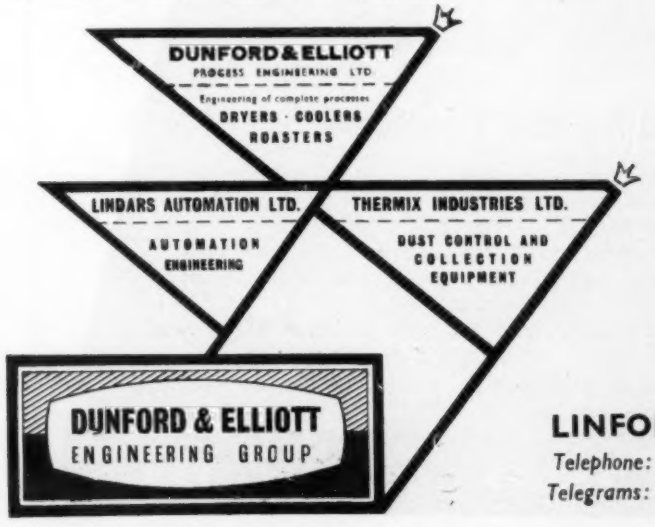

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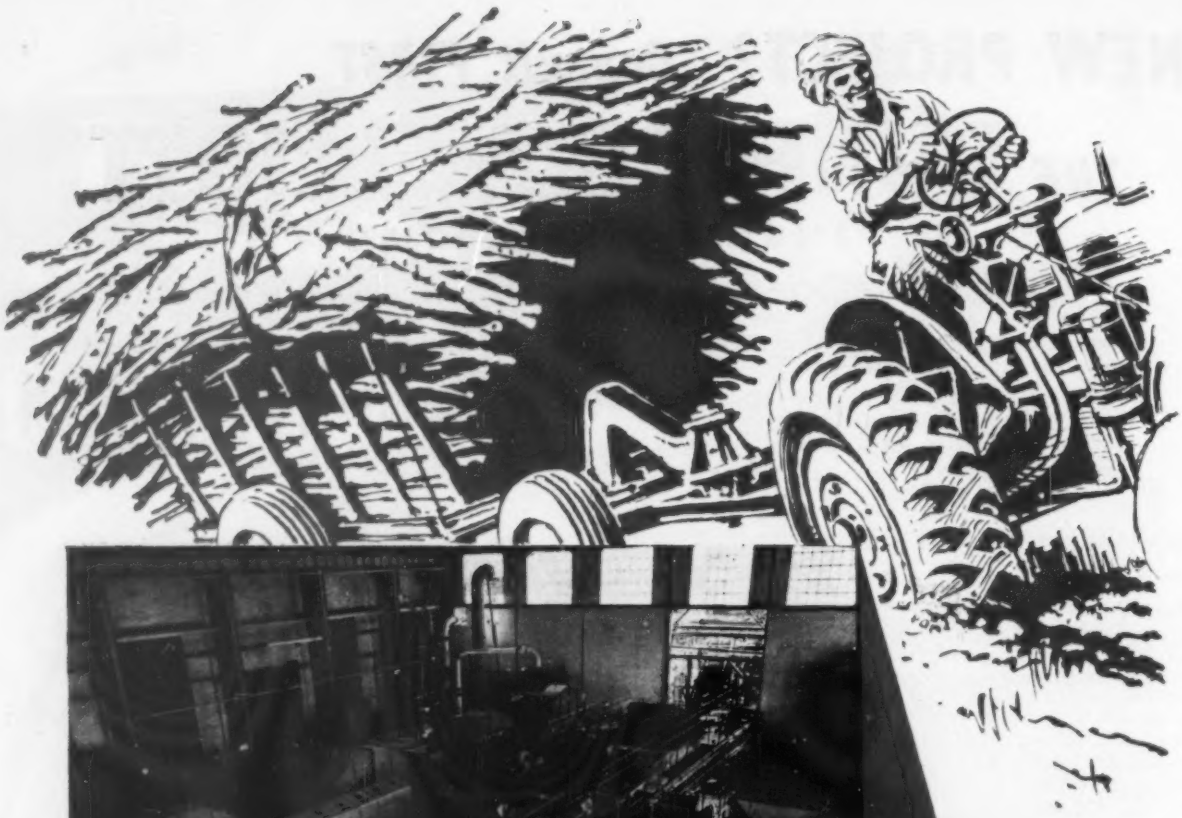

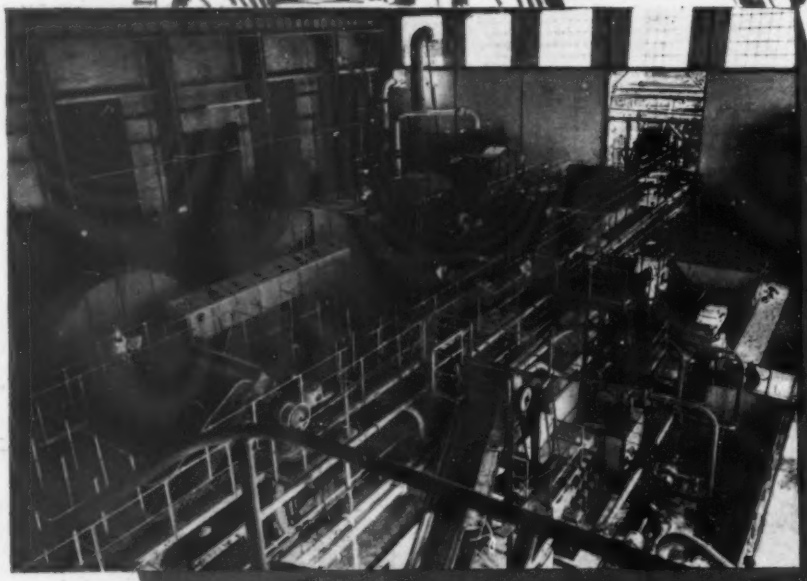

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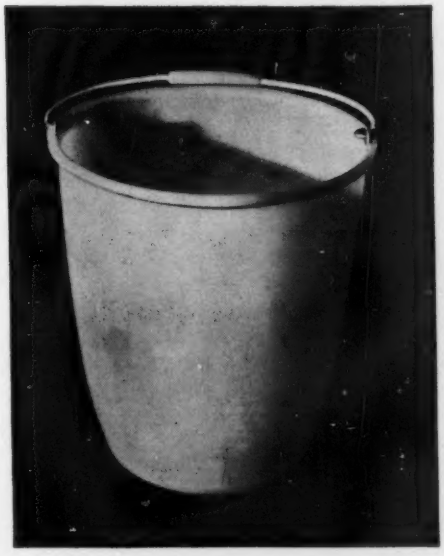

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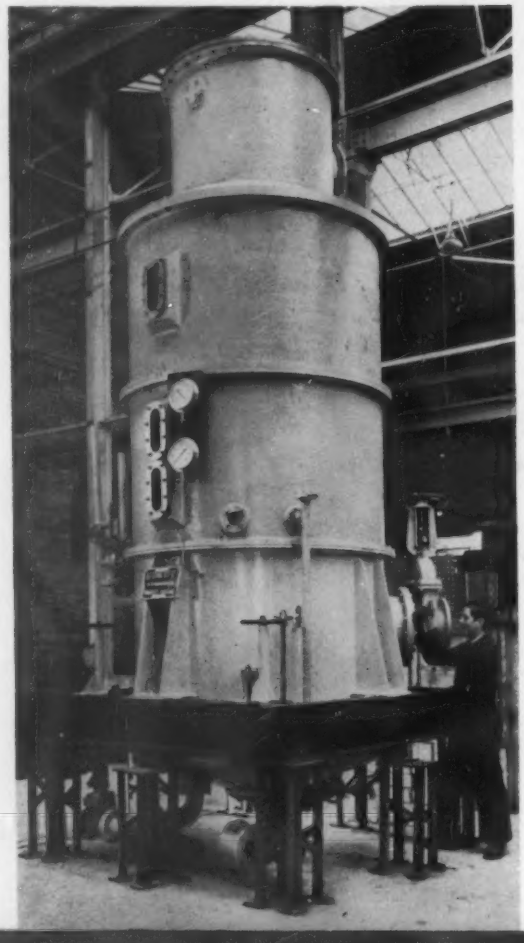

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PAGE

Notes and Comments 117
South African Sugar Crop, 1959/60. British Sugar Corporation Results, 1959. International Sugar Council. Louisiana Sugar Crop, 1959.

* * *

Agricultural Articles :

The Sugar Cane in the French Antilles 119

Exotic Weeds and their Spread 120

Sugar Cane Breeding in Barbados 121
25th Annual Report of the British West Indies Central Sugar Cane Breeding Station, 1958/59.

Agricultural Abstracts 122

* * *

General Articles :

The Development of Hydraulic Gear for Cane Mills. Part II 123
By L. A. Tromp, A.M.I.Mech.E.

Solubility of Pure Sucrose in Water 126
By D. F. Charles.

* * *

Sugar-House Practice 132
Rapid deterioration and destruction of blackstrap molasses in storage. The use of louvres in calandria type vacuum pans. Central control, automatic operation feature Toronto Redpath. 500-ton turbine driven mill at Villanueva *etc.*

Beet Factory Notes 136
Effects of some variables on first carbonatation. Changes in waste-water economy. Improving the heat economy in the sugar factories of the Pomeranian region. Investigations on the wear of rotary diffusers. Purifying carbonatation juice with ion exchange resins. Tests on operation of a lime kiln on natural gas *etc.*

New Books and Bulletins 140
The South African Sugar Year Book, 1958-59 edition. Advances in Carbohydrate Chemistry. Gospodarka Cieplna w Przemysle Cukrowniczym. Stowarzyszene Techników Cukrownikow. Soils of the Sugar Belt.

Laboratory Methods and Chemical Reports 141
Composition of "floc" formed in acidified syrups from refined granulated cane sugars. Colouring matter in molasses as oxidizing-reducing systems. A conductimetric method of determining the volume of crystals in a massecuite *etc.*

By-Products 143
A new process for simultaneously obtaining sugar, alcohol and paper pulp from sugar cane fibre. Dry pulp pressing. By-products research in Hawaii *etc.*

Patents 144
Glutamic acid (from beet wastes). Extraction of materials from solid bodies (Beet diffusion). Filter press. Cane harvester feed mechanism *etc.*

Trade Notices 146
Automatic Weighing Control. Pocket Microscope *etc.*

Cuban Sugar Exports 147

Brevities 147–8

Stock Exchange Quotations 148

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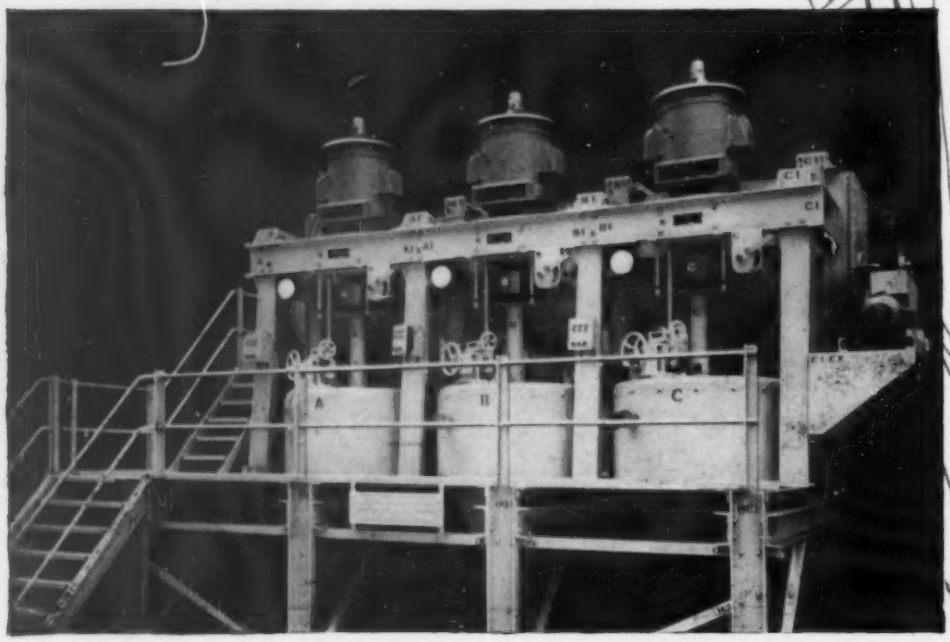

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THE
INTERNATIONAL SUGAR JOURNAL

VOL. LXII MAY, 1960 No. 737

NOTES AND COMMENTS

South African Sugar Crop, 1959/60[1].

The 1959/60 season in South Africa has closed with 1,043,301 short tons, equivalent to 931,519 long tons, of sugar having been manufactured by the Union's seventeen mills from 9,123,395 short tons of cane. This compared with the previous season's record outturn of 1,128,187 short tons of sugar. The decrease in production was reported to have been due to the effects of drought although the conversion rate cane/sugar was an improvement on last season's. In Swaziland the 1959/60 crop is expected to produce 18,750 short tons (16,741 long tons) of sugar which represents an increase of 11,514 short tons over the previous campaign, according to Reuter. It is anticipated that the 1960/61 season will commence in May.

* * *

British Sugar Corporation Results, 1959[2].

By producing a total yield of 5,509,598 tons, the 1959 sugar beet crop just failed to reach the previous year's record 5·7 million tons, according to provisional figures issued by the British Sugar Corporation. It is thus the country's second heaviest crop. The beets contained more sugar, however, (16·90% compared with 15·08% in 1958/59) and total production, estimated at 765,000 tons, constituted a record.

Production of molassed sugar beet pulp in all forms was a record at 520,000 tons.

Extremely high yields of sugar beet were recorded in several factory areas. Spalding area led, with 19·3 tons per acre—the highest so far recorded in this country. Eight other factories—Bardney, Brigg, Cupar, Ely, Peterborough, Poppleton, Selby and Wissington—also set up new records.

Average yields in excess of 15 tons an acre were recorded in four factory areas and in excess of 14 tons at five more. Numerous individual yields of 25 tons an acre or more were attained.

Average yield for the whole country was 13·38 tons per acre, compared with 13·88 tons in the preceding season.

Such satisfactory results were, however, not experienced in all districts. Some were badly affected by the summer drought, and farmers in the Felsted, Ipswich, Colwick and Kelham factory areas averaged between 9½ and 11 tons per acre. Crops in the Southern Area, too, averaged below 10½ tons per acre.

The season had a promising start last spring and most of the seed was sown under good conditions. Later, the early and widespread appearance of green aphids threatened to make 1959 a bad one for virus yellows. An unprecendented acreage—almost 95% in all—was sprayed with systemic insecticide in good time, and the threatened losses did not materialize. The spraying controlled both green and black aphids.

The season's results are attributable to a combination of factors: early sowing on good seedbeds, timely spraying, plenty of sunshine, and good harvesting weather. These combined to give good root weight which was coupled with a high sugar content.

* * *

International Sugar Council.

The Sixth Session of the International Sugar Council was held in London from 30th March to 1st April 1960. H.E. The Hon. L. M. GUERRERO (Philippines), Chairman of the Council, presided over the discussions, which were attended by representatives of thirty countries and by an observer from F.A.O.

The Council adopted revised estimates, made by its Statistical Committee, of the minimum net import requirements of the free market and of supplies available to that market in 1960. Requirements are now estimated to amount to 6,365,000 metric tons raw value, an increase of 515,000 tons compared with the estimate made by the Council at its February session. Total supplies, on the basis of quotas now in effect, and including likely supplies from non-participating countries, are estimated at 5,985,000 tons. Further details are given below.

Having reviewed the statistical position the Council, in the light of the market situation, decided to confirm quotas in effect at their present level of 85% of basic export tonnages.

[1] C. Czarnikow Ltd., *Sugar Review*, 1960, (451), 69.
[2] *British Sugar Beet Review*, 1960, **28**, 108.

In order to ensure that supplies will be available to cover quotas in effect, the Council decided forthwith to redistribute such parts of those individual quotas which in its opinion were unlikely to be used. This action was taken in consultation with the governments concerned. Thus about 750,000 metric tons will be re-allocated to countries able to accept increases in their quotas. (Distributions are pro rata to basic export tonnages subject to the priorities established in the Agreement.)

An application for accession to the Agreement from the Government of Lebanon was welcomed by the Council.

Progress reports of the Council's Multilateral Options Committee and Sugar Consumption Committee were noted.

With a view to facilitating the work of the 1961 United Nations Conference which is to review the 1958 International Sugar Agreement, the Council established a Preparatory Committee.

The Council decided that unless market conditions otherwise dictate, its next session will be held not later than the end of July.

Details of the revised quotas in effect are given below.

Country	*Quotas in effect at outset of Sixth Session*	*Quotas in effect on 1st April 1960*
	(*metric tons raw value*)	
Belgium	46,750	0(*a*)
Brazil	467,500	518,009
China	677,500(*b*)	771,142(*b*)
Cuba	2,197,250(*c*)	2,592,510(*c*)
Czechoslovakia	233,750	258,773
Denmark	63,750	30,000(*a*)
Dominican Republic	575,450(*d*)	669,092(*d*)
France	18,000	0
Haiti	40,500	6,000(*a*)
Hungary	36,000	36,574
Indonesia	340,000(*e*)	50,000(*a*)(*f*)
Italy	18,000	20,859
Mexico	63,750	70,114
Kingdom of the Netherlands	36,000	0(*a*)
Peru	416,500	486,553
Philippines	40,500(*g*)	44,074(*g*)
Poland	167,000	50,000(*a*)
Portugal	18,000	0(*a*)
U.S.S.R.	170,000	0(*a*)
TOTAL	5,646,200(*h*)	5,603,700(*f*)(*h*)

(*a*) Exports under quotas in effect in accordance with the Council's determination under Article 19(2).
(*b*) Including Special Reserve of 80,750 tons under Article 14(5) and 40,000 tons Hardship Reserve for 1960 under Article 18(6).
(*c*) On basis of basic export tonnage of 2,415,000 metric tons plus 170,000 metric tons carry forward of 1959 quota.
(*d*) On the basis of basic export tonnage of 655,000 metric tons plus 22,000 metric tons carry forward of 1959 quota.
(*e*) *Including* Special Reserve of 42,500 tons under Article 14(5).
(*f*) *Excluding* the Indonesian Special Reserve of 42,500 tons, not expected to be used and not subject to redistributon.
(*g*) Including Special Reserve of 18,000 tons under Article 14(5).
(*h*) Article 14 also provides that Costa Rica, El Salvador, Guatemala, Nicaragua and Panama may each export up to 5000 metric tons raw value each year.

* * *

Louisiana Sugar Crop, 1959[1].

The 1959 Louisiana sugar cane crop has turned out to be rather disappointing but unique in many respects. The 1959 Proportionate Share Determination for the Mainland Cane Area increased the allowable acreage for sugar and seed by 10% above that of the 1958 crop, and on March 4th 1959 all restrictions were lifted except that planting after that date was prohibited. At that time many planters had not ploughed out the stubble cane that normally would have been ploughed out if the original determination had remained in effect. Therefore, the anticipated acreage for harvest was increased to about 113% of 1958.

During the summer various estimates indicated a record crop of both sugar cane and sugar. Estimates of sugar production varied from about 490,000 short tons, raw value, to as high as 520,000 tons. It later developed that excessive rains in some areas prevented the proper "laying-by" of the crop and borers caused considerable damage in others. Also, mosaic disease appeared in many varieties of cane planted east of the Atchafalaya River which naturally reduced the yield per acre.

To add further difficulties, freezes in early and middle November made selective harvesting necessary. It appeared to be the only way of preventing a disaster and much credit must be given to research workers, the American Sugar Cane League, mill management, producers and others interested in the welfare of the industry who realized that a near crisis was impending and heroic measures were necessary. Because of this procedure, much tonnage was therefore necessarily lost by severe topping back of sour joints. This was the only way possible to keep the mills going and, in fact, not a single mill was forced to close down because of sour cane.

At the beginning of the crop the total planted acreage for sugar and seed was estimated at 268,000 compared with the actual acreage harvested in 1958 of 239,490. This represented an increase of 11·9% over the previous year. Of this total 247,000 was indicated for sugar and 21,000 for seed. There may have been some abandonment because of the freeze, the extent of which is not now known, but is estimated at about 3000 acres, leaving 244,000 acres harvested for sugar alone. With 5,073,000 net tons of cane ground for sugar during the 1959 crop, the probable yield per acre was about 20·5 tons compared with 22·2 tons in 1958.

The 5,072,611 tons of cane ground compared to 4,869,000 in 1958 represents an increase of 4%. The total sugar produced was 0·5% less, at 440,400 short tons, raw value, compared with 442,793 tons in 1958. This was made up as follows[2]: 361,958 tons of 96° raw sugar, 37,946 tons of turbinados, 22,994 tons of refined granulated sugar and 6374 tons of plantation granulated sugar. Blackstrap molasses produced amounted to 31,846,438 gallons, while 1,217,822 gallons of syrup was made by those mills equipped for making syrup from cane, 52,426 tons being used for that purpose.

[1] *American Sugar Cane League*; through *Willett & Gray*, 1960, **84**, 93.
[2] *Sugar y Azúcar*, 1960, **55**, (3), 33.

THE SUGAR CANE IN THE FRENCH ANTILLES

THE Cane and Sugar Technical Centre in Guadeloupe and its Dependencies was founded in 1953, and its work since its inception is summarized in the Annual Report for 1958. Its organization is simple, with a central Administrative Council of 15 members covering two main sections, technical and administrative, and four sub-sections dealing respectively with experimental work, services to planters, a laboratory dealing both with agriculture and technology, and a secretariat. The 15 members of the Council include 4 representatives of the planters, 4 of the factory, 2 of the technical personnel, 2 of labour and 3 selected for special qualifications. It has established close liaison with the numerous organizations concerned with agricultural interests in the Island. It has set up five Commissions: for agricultural mechanization, for herbicides, for fertilizers and varieties, for the management of the real estate of the Centre and for the study of a system for the payment of cane based on quality. Co-operation exists with the "Services Agricoles et de Crédit Social Antillais" for the purpose of popularising the fruits of the Centre's work, with the "Génie Rural" in matters concerning irrigation and with the "Institut National de Recherches Fruitières d'Outre-Mer" in herbicidal investigations.

Of the work in progress one section consists of the preparation of charts and soil types, the principal characteristics of which have already been determined by analysis. They are being mapped on a 1:20,000 scale and, in cases, on a 1:5,000 scale. Much of the laboratory work, however, is concerned with detailed analyses connected with the fertilizer experiments and the reaction of fertilizers on different soil types, particularly in comparison with those in their natural state.

In the absence of any breeding station, Guadeloupe is dependent on imported varieties, mainly from the Barbados Cane Breeding Station. The present standards are, for Grand-Terre, B 4098, B 41227, B 46364 and B 4744, and for Guadeloupe s.s. B 37172 H 32-8560 and H 39-3633. The methods of selection including laboratory tests for quality of juice are described in some detail up to the stage of distribution to planters.

A brief résumé of the various fertilizer experiments is given. The experiments are conducted at 4 stations representative of different soil types and cover, besides N.P.K. in replicated series, Ca, Mg and organic manures including green-manuring. Throughout growth, 15-day interval records are taken of growth rate, stem number, and foliar analysis based on the 3rd leaf.

The commission established to consider the question of payment for cane on a basis of quality has reached certain conclusions. There are two different aspects: one for cane delivered in small lots of 1 ton or under, the other in lots exceeding 5 tons. In the former case, the produce of small planters, the provision of special trucks of 5 ton capacity minimum in which the smaller loads can be aggregated is suggested, and payment made on analysis by agreement between the planters or in accord with Administrative instruction. The latter involves difficulties of sampling for analysis and is best done by analysis of first juice, lime placed on the end and beginning of each load producing a change of colour in the juice at the junction of different lots. The method adopted in Réunion by which regions are demarcated in which cane is considered to be of the same quality, is held to be inapplicable.

Other sections of the Report deal briefly with irrigation, herbicides, of which a number have been tested, and assistance to small planters.

The Technical Centre of Martinique has issued two bulletins, the first dealing with the results of the 1959 fertilizer experiments, and the second with the 1959 varietal trials. The 50 pages of the first contain detailed records of a number of experiments on soils of differing types, some of which include returns up to the 5th ratoon crop with 7 dressings of 3 differing levels of N, P and K. The results vary so greatly that no general summary can be given though, in certain cases, marked deficiencies in K are indicated. Attention is drawn to the number of intervening factors that can affect the results and it is, perhaps, legitimate to wonder whether these time-consuming experiments are not searchings for something too elusive for statistical determination. A brief supplement describes the experiments in Martinique due to be harvested in 1960.

The second, also of 50 pages, describes the varietal work undertaken in detail too great for more than the barest comment. The most outstanding result in comparison with B 4098 and B 37172 as standards, is the superiority of B 50135 on sandy, well-drained soils. B 46364 ratoons well; B 41227, agriculturally superior, behaves indifferently in the factory, B 5352 promises very well, but has only been carried to the 1st ratoon.

H. M.-L.

Bacterial fertilizers in the Soviet Union. *Soils and Fertilizers*, 1959, **22**, 327–333.—The information reported here was gathered during a visit to the Soviet Union and suggests that considerably greater attention has been given in that country than elsewhere. Application of preparations of *Azotobacter spp.*, *Bacillus megatherium* and *Rhizobium spp.*, are now standard farm practice and many other microbes are under investigation. The evidence, though in certain respects deficient, is sufficient to indicate that the study should not be neglected.

EXOTIC WEEDS AND THEIR SPREAD

THE risk arising from the importation of exotic species to environments, where they are freed from the natural controls which kept them in check in their home environment, is well known. It is the justification for the rigid quarantine regulations in force in most countries. Primarily, however, the function of quarantine is thought of in terms of the control less of the imported plant than of the diseases it may carry. But there is no little danger that the plant itself and, in cases, animal, may become a disease or pest. Of the latter, the introduction of the rabbit to Australia is a well-known instance.

Three instances of imported plants running wild in a new environment which lie within the writer's personal experience may be of interest. Early in the century, *Lantana*, an ornamental garden plant, was commonly grown in Indian gardens and was confined to them. Twenty years later, brakes, so dense that elephants had difficulty in thrusting their way through, were to be found throughout the swampy "Tarai" belt at the foot of the Himalayas. In Ceylon, *Lantana* had earlier become a pest and hope had been placed in a composite plant, if memory serves, a species of *Helianthus*, but, by 1904, it was becoming apparent that the remedy was worse than the disease.

Many years later, a Governor of Trinidad with African experience suggested the introduction of Kikuyu grass (*Pennisetum clandestinum*). With experience of this grass in South Africa where the stolons from the original planting had passed under a broad highway to form a dense growth on the opposite side, it was not difficult to recommend that, if the introduction be made, planting should only be within the confines of a space surrounded by a deeply sunk concrete wall.

In recent years, Australia has had, and still has, reason to regret the importation of the giant sensitive plant (a *Mimosa*) which, like the previous examples, is a wild growth; for *Lantana*, if grown in gardens, is essentially wild and unaltered by the small amount of domestication it has received. It is less common to find a cultivated plant developing into a pest, yet this, again an Australian experience, is the case with the Gambia pea (*Crotalaria goreensis*), grown for its value for green manuring. Now replaced by more promising varieties, the plant, through natural propagation by seed, is spreading along tramlines and road verges and is likely to offer an extensive weed problem. An account of the measures now being undertaken for eradication or at least control using 2,4,5-T, have been recently described by G. C. BIESKE[1].

H. M.-L.

AGRICULTURAL ABSTRACTS

Leaf composition of lowland rice and sugar cane as an indicator of their performance. GO BAN HONG and J. VAN SCHUYLENBORGH. *Netherlands, J. Agric Sci.*, 1959, **7**, 110–117; through *Soils and Fertilizers*, 1959, **22**, 2147.—The ratios of N to P and K in the leaves of rice and leaves and/or stems of sugar cane at different periods of growth indicate that foliar analyses of 30-day-old rice plants and of sugar-cane tops at an early stage of development will give a good indication of the crop's performance. The mobilities of major nutrients showed a decreasing order of P>N>K in rice and N>P>K in sugar cane.

* * *

Precipitation—temperature effect on cane yields. E. S. LYONS. *Sugar y Azúcar*, 1959, **54**, (9), 29, 38.—Monthly correlations covering a period of 20 years are given for yield and temperature; partial correlations for the same factors are also given. In the first case there is a positive correlation between yield and precipitation for April, 0·627, significant at 1% level and, at the 5% level, between yield and temperature, for March, 0·547 and August, 0·447. The only partial correlation, significant at the 5% level, is that between yield and precipitation for April, 0·614.

Pre-emergence herbicides reduce labour costs. J. R. NAIL *et al. Sugar y Azúcar*, 1959, **54**, (9), 30, 31, 40.—The paper reviews cost of controlling weeds in the cane crop in different countries and describes the advantages of the two herbicides "Televar" and "Carmex" produced by E. I. du Pont de Nemours & Co., with which the authors are associated.

* * *

More sugar per acre through a new chemical. P. ARAVAMUDHAN. *Indian Sugar*, 1959, **9**, 85, 86.—Trial with terpineol mixed with "Albolenium" as adhesive and sprayed towards the end of the season, checked deterioration and gave a 4% increase in yield.

* * *

Vegetative growth index as a guide to N manuring. V. RANGANATHAN and R. P. RAJA. *Indian Sugar*, 1959, **9**, 199–201.—Accepting the fact that weight of standard leaf and N level are both positively correlated with cane yields, the authors describe a method of calculating from the "vegetative index" derived from the former N requirement, thus obviating the laboratory analyses involved in foliar diagnostic technique.

[1] *Cane Growers' Quarterly Bull.*, 1959, **23**, 52.

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SUGAR CANE BREEDING IN BARBADOS

25th ANNUAL REPORT OF THE BRITISH WEST INDIES CENTRAL SUGAR CANE BREEDING STATION, 1958-59

A REVISED form has been adopted for the report by which a summarized account of the results is presented with the detailed data relegated to a series of Appendices. The change adds much to the readabilitity of the Report and, combined with a change of format, is a pleasing one on which the Advisory Committee are to be congratulated. The Station is becoming more than a West Indian Commonwealth Institution for it already receives contributions from foreign interests such as the La Romana Corporation in the Dominican Republic, and conditional acceptance has been given to the inclusion of Costa Rica among foreign contributors.

The experiments in devising a solution technique for crossing have proved very successful. Excellent germination has been obtained from crosses between canes grown in 5 gallon pails, enamelled or internally treated with anti-corrosive paint and protected from damage by cut canes with plastic pads. The solution consists of rain-water carrying about 150 p.p.m. sulphurous acid and 85 p.p.m. phosphoric acid. Excellent germination was obtained both in Barbados and other territories to which fuzz had been sent by air in polyethylene bags with calcium chloride. Field plantings consisted of 22,216 single seedlings and 14,947 in bunches. The complexity of the hybridization now attained is indicated by the fact that among the B 60 series (bred in 1956), are included the crosses *S. officinarum* × *S. spontaneum* × *S. barberi* × *S. sinense* and *S. officinarum* × *S. spontaneum* × *S. barberi* × *S. robustum*.

The trials of the B 55 to B 59 series, conducted at both high and low rain-fall stations, show numerous very promising seedlings which, however, require further test. Of the B 54 series 7 seedlings are enumerated with their main characteristics as based on plant cane results. The B 53 series yielded no seedlings of merit but, in the B 52 series, 8 seedlings are enumerated on the basis of 3 crops.

Research

The possibilities of in-breeding are being probed and valuable results are already appearing, especially in the matter of disease resistance, B 49119, with its resistance to rotting, being an example. The approach is triple according to the degree of in-breeding. The first is crossing between related parents—the origin of B 49119. In the second, termed top crosses, male parents, selfed for a few generations, are crossed with proven female varieties; several such crosses are now under test. Continuous selfing constitutes the third and several selfings have already reached the 5th and 6th generation. The value of in-breeding in sugar cane has formed the subject of much disputation and the various arguments are briefly reviewed.

A curtailed programme of cytological work, due to absence on leave of the Senior Geneticist, had particular reference to the in-breeding programme and included an investigation of the causes of male sterility in standard female parents. In inter-specific aneuploid foundation varieties, chromosome losses on selfing appear to be the rule rather than the exception. With the successful use of cut arrowing stems in breeding, preliminary and encouraging experiments have been made in emasculation by hot water treatment.

Notes are added on the survival in bunch-planted seedlings and the technique involved; of the value of selection percentages in judging parental performance and on the effect of heat treatment for ratoon stunting disease. In the latter, a definite increase in arrowing was observed leading to a significant decrease in yield.

Varietal Trends in Contributing Territories

The varietal changes in commercial crops are relatively small. In Trinidad B 41227 shows an increase which, however, is limited to one group of estates. Antigua shows a marked reduction in the area under B 4098, formerly holding almost a monopoly position, in favour of B 49119. Barbados shows a sharp fall in B 37161 with corresponding increases in B 4744, B 45151 and B 49119. In St. Kitts B 41211 has replaced B 37161 as leading cane, but these two occupy over 80% of the area. In St. Lucia B 34104, a former favourite, is being eliminated owing to its susceptibility to leaf scald and its place taken by B 37172 and B 37161 which together occupy over 83% of the area.

AGRICULTURAL ABSTRACTS

Insect pests of the sugar cane in India. III. The top borer. B. D. GUPTA. *Indian Sugar*, 1959, **9**, 127–149.—The top borer, *Scirpophaga nivella*, is among the most serious pests of sugar cane in India. A full description is here given of the pest in all its aspects from its status in classification, through life history and nature of injury done to methods of control, including therein an account of the natural enemies and the potential value of these for biological control.

* * *

Flowering and breeding performance of container-grown sugar canes. P. H. DUNCKELMAN. *Sugar Bull.*, 1959 **38**, 46–53.—A detailed account is given of growing 60 commercial varieties out-of-doors in 10 to 20 gallon galvanized iron cans together with a record of their seed production.

Sugar cane manuring and press mud cake from sulphitation factories. S. K. CHOPRA. *Indian Sugar*, 1959, **9**, 205–207.—Recommendations are made for the use of press mud, now commonly sold to brick kiln owners at a nominal price, composted with yard sweepings containing trash, cattle dung and urine.

* * *

Insect pests of sugar cane in India. IV. The green borer, *Raphimatopus ablutella*. B. D. GUPTA. *Indian Sugar*, 1959, **9**, 269–271.—The pest is a Pyralid stem borer occurring in the hot weather (May–June) in the Gangetic plain. The various stages and life history are described together with control measures, largely dictated by the fact that the eggs are laid on the ground.

* * *

Sugar cane in British Honduras. *Ann. Rpt. Dept. Agric. Br. Honduras*, 1958.—The relatively small sugar cane industry of the country is located in the Northern Section and mainly in the Corozal District. The total area under sugar cane in this district (in 1958) was 10,229 acres with another 514 acres in the Orange Walk District. 314 farmers delivered 89,635 tons of cane to the factories. There has been a marked improvement in factory efficiency. Crude sugar is also made in the Toledo District where there is a small area under cane.

* * *

Controlled pollination in sugar cane. J. C. SKINNER. *Tech. Comm.* (Bureau Sugar Exp. Sta., Queensland), 1959, (1), 20 pp.—Isolation in open forest or in voile lanterns have both been proved to be ineffective in ensuring complete freedom from cross-fertilization. This was obtained with lanterns of closely woven cotton material (mesh $<0{\cdot}06 \times <0{\cdot}08$). For research work the lanterns should remain continuously closed but for seed production they are best left open at the bottom during the afternoon and night, giving an efficiency of 99%. Such lanterns can be assembled in a compact area with considerable saving of labour.

* * *

The effect of cyclones on the sugar crop in Mauritius. A. D. SWAN. *Rev. Agric. Sucr.* (Mauritius), 1959, **38**, 172–173.—The work is a continuation of that recorded earlier[1]. The difficulty lies in determining what the yield would have been when the effects of the many factors influencing it have been taken into account. This can only be determined at the end of the season. The difference between the determinations by the present and former method are of the order of 2%.

A review of tractor farming in Taiwan. WAN-CHUN HSU. *Taiwan Sugar*, 1959, **6**, (5), 13–19.—Mechanization was introduced into the cane fields of Taiwan only 10 years ago, yet cultivation is now almost entirely mechanized. It has played an outstanding part in that period in raising the harvested area from 57,431 to 92,380 ha and the yield of sugar per ha from 4·59 to 9·67 million tons.

* * *

Resistance trials for mosaic disease. LII-SIN LEU and YUN-SUN BAU. *Taiwan Sugar*, 1959, **6**, (5), 24–27.—Resistance to the three strains of mosaic, yellow stripe, short stripe and fine stripe, was determined by inoculation of 79 seedlings, of which 24 proved very resistant to all 3 forms.

* * *

A comparison of soil and water losses as well as cane production in terraced and unterraced fields. TIEN-TSO CHANG. *Taiwan Sugar*, 1959, **6**, (7), 16–23.—The respective figures for the unterraced and terraced fields were found to be : runoff, 7,623 and 5,616 cu.m./ha (74%), soil loss 309,011 and 22,129 kg/ha (7%), cane yield 93,227 and 111,536 kg/ha (119%). The heavy soil losses are mainly due to heavy rain before the cane had closed in.

* * *

Potassium fixation in some soils of the Victorias Milling District. MANASES ROBENIOL. *Victorias Milling Co. Expt. Sta. Release*, 1959, (29), 12 pp.—The conclusions reached in this study are that (a) fixation of potassium increased with each addition but in lessening proportion, (b) the seat of fixation lies in the clay fraction, (c) fixation is increased by removal of organic matter and by the addition of lime but retarded by ammonium sulphate, and (d) fixation is more intense in the second than in the first foot.

* * *

Trial planting of young first year seedlings from cuttings. M. T. ILAGAN *et al. Sugar News* (Philippines), 1959, **35**, 480–481.—Cuttings from 5-month old seedlings, when compared with the stubs, showed a highly significant reduction in number of tillers and diameter of stalks but not in height.

* * *

Varietal responses to phosphorus and potash. F. A. BASILA. *Sugar News* (Philippines), 1959, **35**, 482–485.—Differing responses are recorded by the varieties POJ 3016, H 37-1933 and CP 29/116.

[1] *I.S.J.*, 1958, **60**, 222.

THE DEVELOPMENT OF HYDRAULIC GEAR FOR CANE MILLS

By L. A. TROMP, A.M.I.Mech.E.

PART II

Hydraulic Top Caps for Mills

Of the numerous types of caps some representative ones will be reviewed. In Fig. 7 is shown the design of a mill cap for a rebuilt old-type mill. The hydraulic cylinder or bonnet *c* containing the ram *p* of a diameter of *D* inches is attached to the mill cap *m* by a bayonet connexion having 4 lugs *O'*.

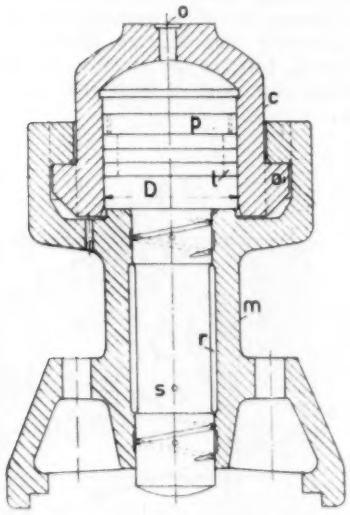

Fig. 7

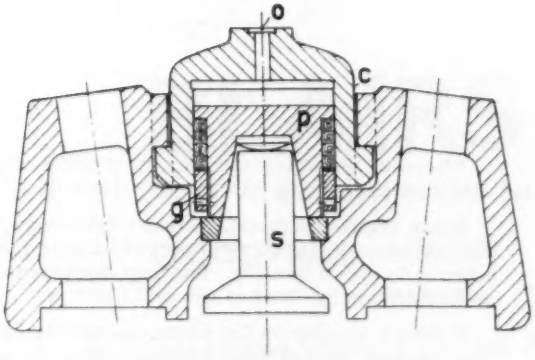

Fig. 8

By inserting the cylinder between the 4 corresponding lugs of the mill cap, it will be fastened by one quarter of a turn.

Owing to the short centre distance of the king bolts, a long stem *s* must be provided, which is a good feature for proper guiding of the piston *p*, when made in one piece with the latter.

It is essential to fit a proper rebate *r* with a drain connexion, so that the stem which may be stuck with rust or hardened grease can be cleaned by a solvent such as kerosene or petrol.

The hydraulic packing *l* is compressed by the hydraulic fluid through a number of small holes on the piston top, but it has been found that the heavy compression of the packing may interfere with the piston movement.

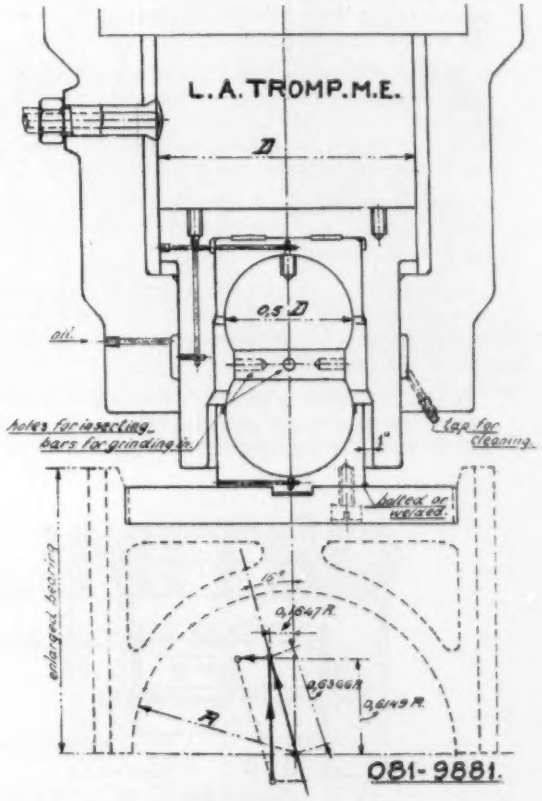

Fig. 9

On dismantling such mill caps, the writer has found cases where the piston had to be removed by a considerable hydraulic pressure. At *o* is the oil pipe connexion to the accumulator on top of the bonnet. In Fig. 8 an improvement of this bonnet type has been achieved by tightening the hydraulic packing by a threaded gland *g* on the lower part of the piston *p*.

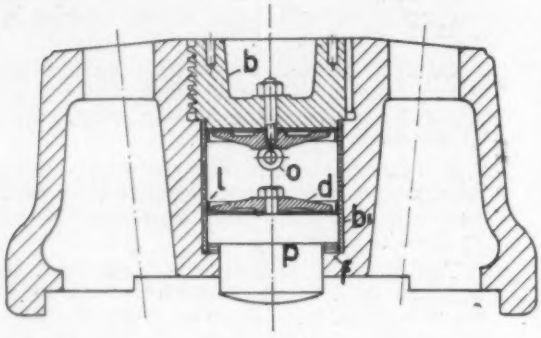

Fig. 10

As an interesting feature the spherical pivot plate on top of the stem *s* should be mentioned, as well as the hollow piston.

Although the swivelling effect of this design may be questioned, a free swinging member between the piston and the pressure plate on top of the mill roller bearing was considered some 30 years ago, but it did not find practical introduction.

Curiously enough the writer presented a design as shown in Fig. 9 to several manufacturers in 1951, but it was declined.

Nevertheless a well known American manufacturer of hydraulic gear lately applied for a patent on a similar design of free piston movement, which now will be put into practice.

In Fig. 10 is shown a well known design of American origin now no longer manufactured although it is still in use in a large number of installations.

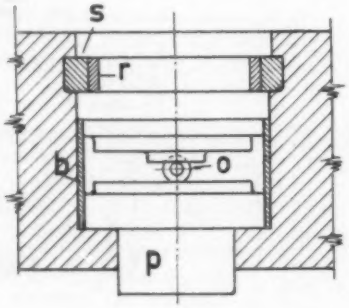

Fig. 11

With this design the piston does not move in a separate bonnet or casing but operates in the mill cap itself; the hydraulic cylinder is closed by a breech-block *b* provided with interrupted trapezoidal threads like those in guns, where the breech-block is fastened by one third of a turn.

For packing, two leather cups *l* with pressure plates *d* are used, one on the breech-block and the other on the piston *p*.

It should be noted that the piston moves in a bronze bushing b_1 whereas the oil entrance at *o* is obtained by a special brass union on the inner side of the mill cap.

This allows replacement of the leather cups without dismantling the oil pipes.

Impurities in the hydraulic liquid will not only easily damage the leather cup on the piston, but will also damage the brass bushing and when the latter is not properly smooth, the leather cups are easily destroyed, because the pressure on the inside of the standing cup ledge is high and thus the friction is great.

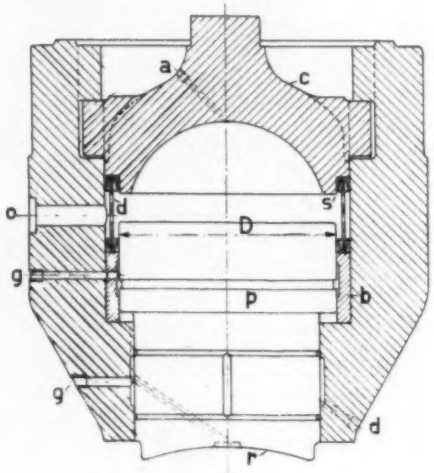

Fig. 12

Moreover the piston top must have sharp corners and it must fit snugly into the brass bushing.

Below the piston recess, there are filler rings *f*, as it is necessary to have a stop on the hydraulic piston, when in its lowest position The rings can be removed to compensate for wear of the mill bearings.

If there is no stop on the piston, the bearing halves may squeeze the top roller gudgeons when the mills run idle.

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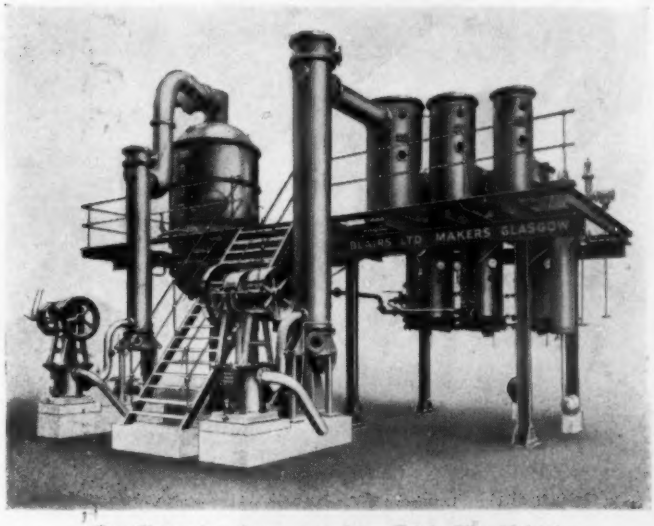

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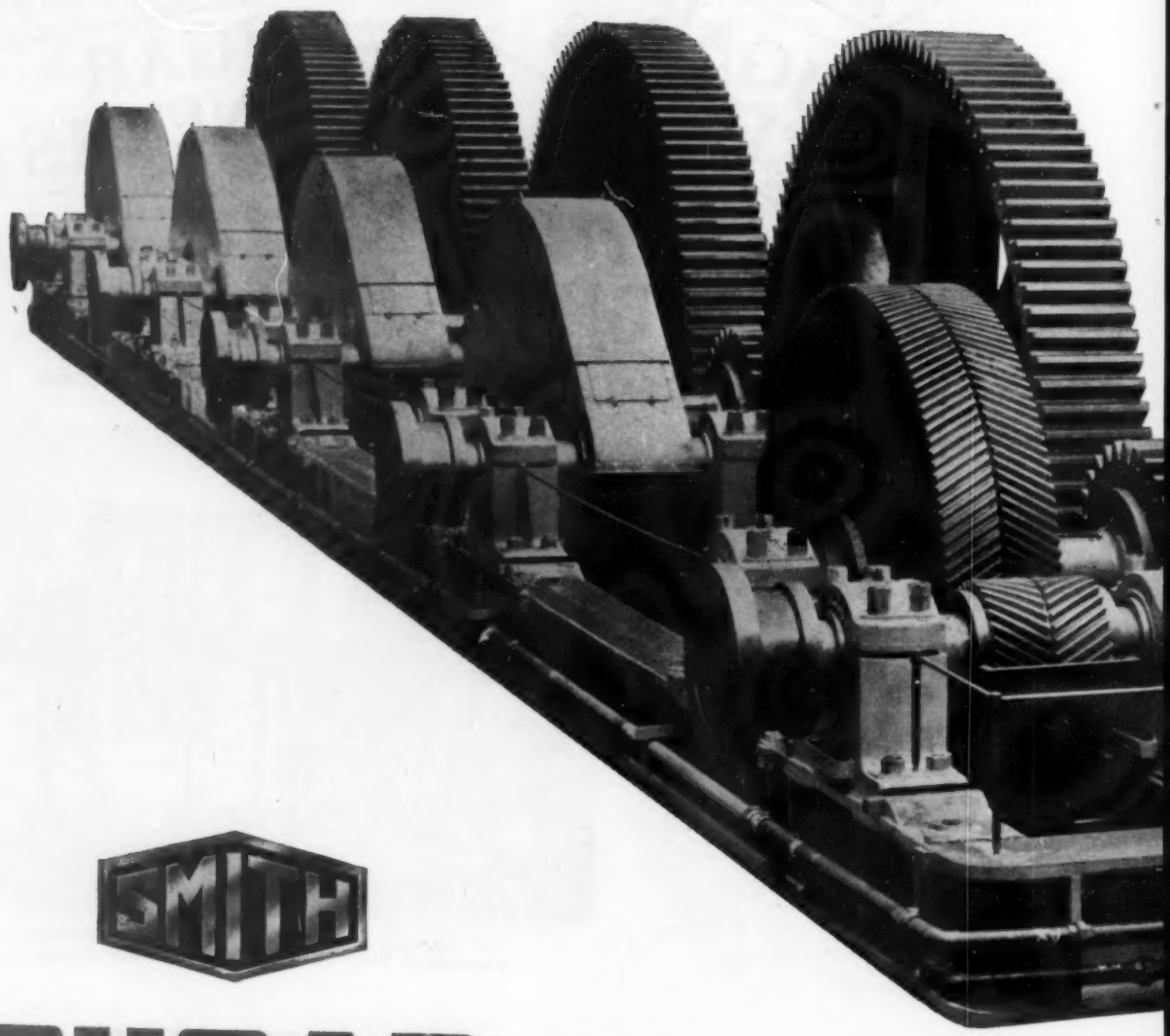

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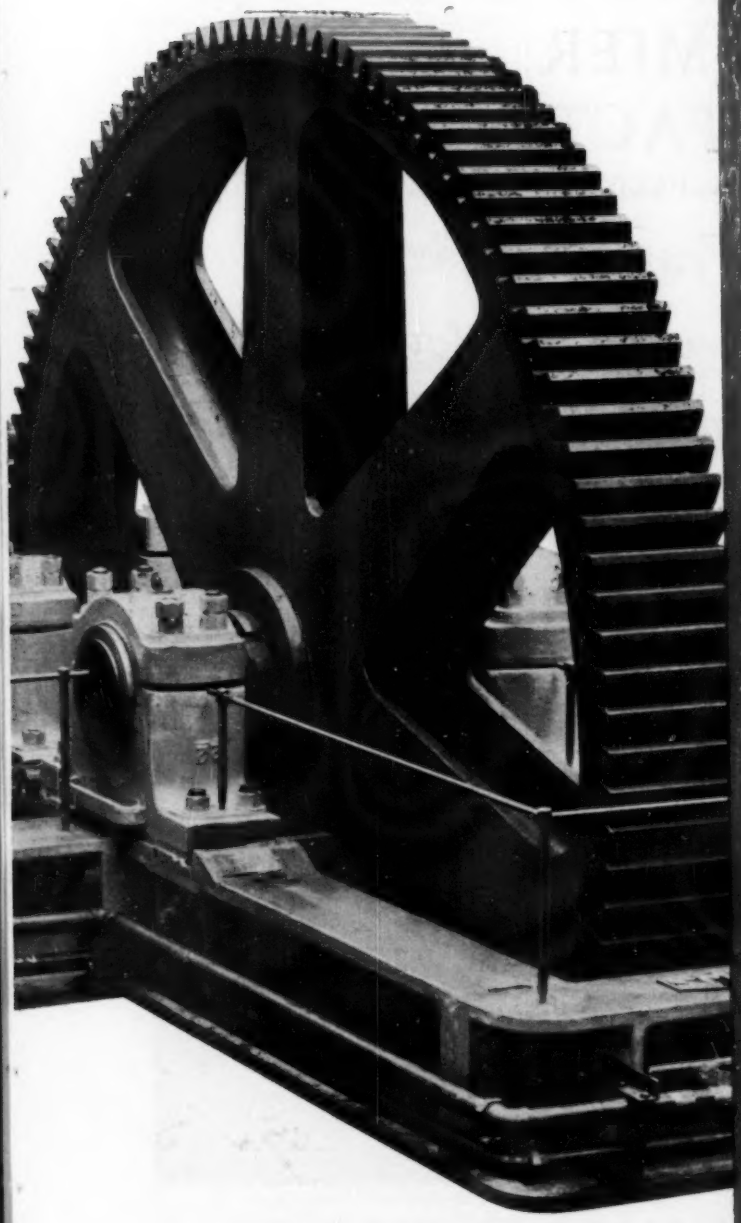

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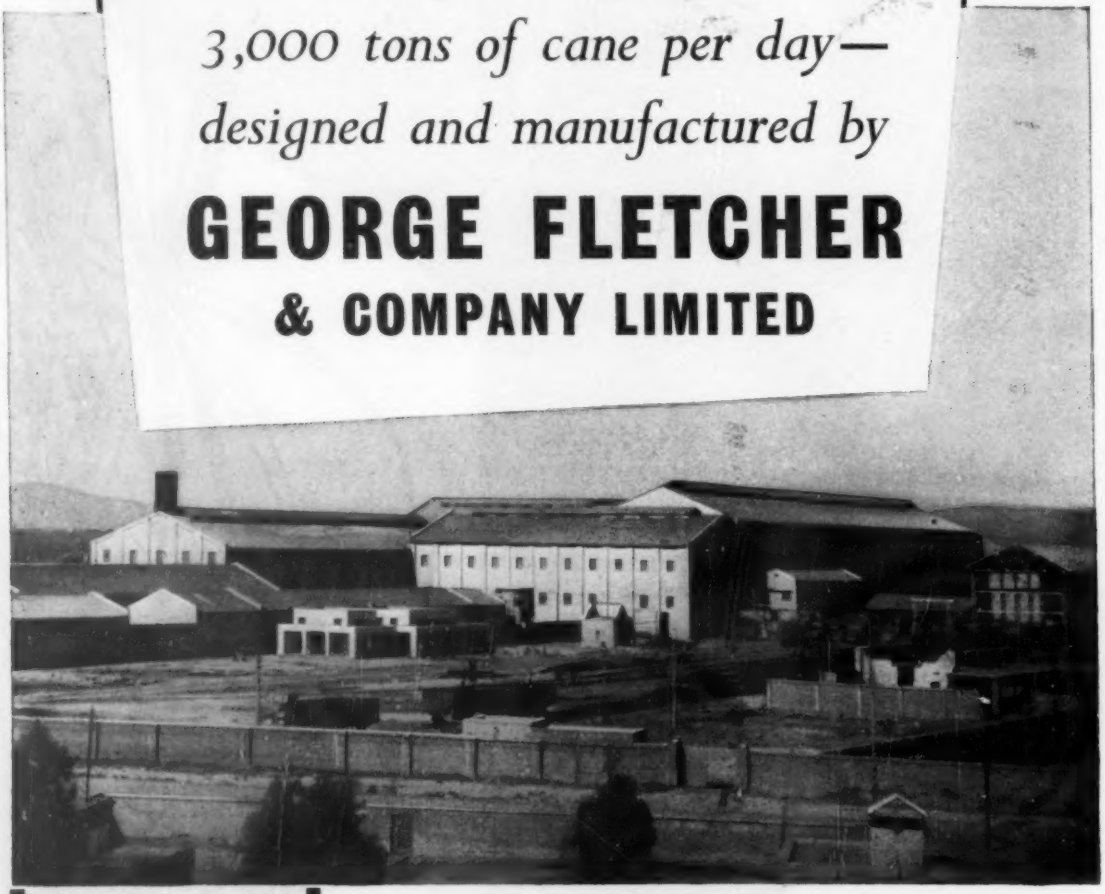

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In the new designs the short piston has become obsolete and the long piston now is a standard feature.

To the same design belongs the design of Fig. 11 the piston *p* as well as the breech-block in this case provided with leather rings of U shape.

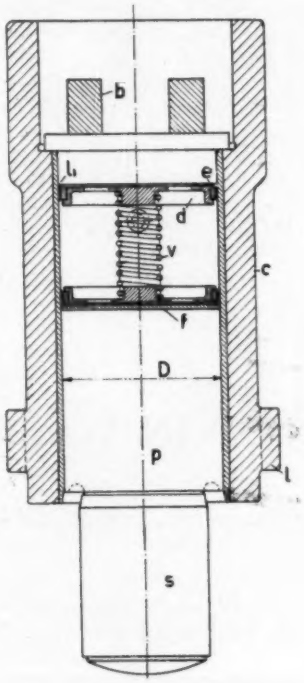


Fig. 13

The breech-block is fixed into the mill caps by a ring *s* cut in 4 segments, so these can be placed in the corresponding receding groove of the mill cap.

Inside this sectioned ring is placed a solid ring *r*, so the sections of the former remain in place.

With the hydraulic caps so far dealt with, the packing moves up and down with the piston and thus causes wear or even seizing of the hydraulic cylinder or its bushing.

Instead of having the packing moved, the interesting design of Fig. 12 has a stationary packing-ring for the piston *p*.

In the cover *c*, having integral bayonet lugs, similar to the first cap constructions described, a packing ring *s* is laid around the recessed diameter.

On the bronze bushing *b* is laid the second packing ring and between this and the packing in the cover, a distance ring *d* of heavy brass plate with large perforations, is placed so as to hold both packing rings in position.

Mounting these packing rings now becomes an easy matter, if the material is a special tanned leather which will not harden. Sometimes the bottom of the recesses for the packing rings are concavely curved according to the shape of the latter, but manufacturers of the packing rings do not recommend this and prefer a flat recess bottom with wire-edges removed.

Instead of leather packings there are now very good plastic rings, which are on the market under different trade names.

The general characteristics of these materials are high elasticity and strength, high wear resistance and a low friction coefficient. For any special size of recess a mould is made by the manufacturer, which costs extra, but the price of the rings is normally lower than for other materials.

Moreover the cross section of these rings has a flat bearing surface on the recess area of piston or cap grooves.

In the figure hydraulic fluid is admitted at *o* and grease lubrication at *g*, the rebate having a drain at *d* for periodical solvent flushing. Air is released from the cover *c* by a small valve at *a*.

There is practically no wear on the brass bushing *b* but there is on the more resistant steel piston *p*, which is concavely and cylindrically formed at *r*, which in turn rests on the cylindrical top part of the pressure plate on the mill bearing.

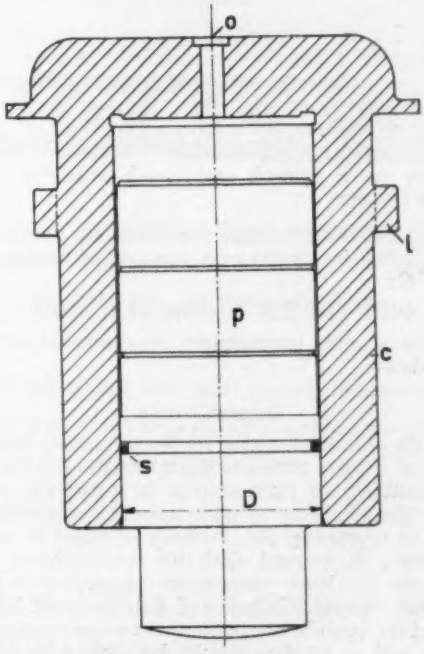


Fig. 14

The camber is at right angles to the top roller axis. Another type of fastening of the breech-block is shown in Fig. 13, where it is held by two heavy steel bars of rectangular section for easy removal of the former.

The casing *c* is fastened into the mill cap by lugs *l* as previously described and having an interior brass bushing.

Leather cup packing *l* is applied at the piston and the breech-block, but having inside a self-expanding ring *e*, all held together by pressure plates *d*, which are kept in position by the spring *v*.

As with all hydraulic pistons, these must fit snugly into the bushings with very small clearance and the surfaces must be absolutely smooth, as otherwise the packing will extrude at the piston ledge.

Where extruding has occurred, a disc *f* of vulcanite or other hard plastic material, closely fitting into the bushing, will usually remedy this drawback.

One of the latest designs is shown in Fig. 14, the packing consisting of a plain O-ring *s* made of a wear resisting plastic.

The long piston *p* has a small clearance over the largest part of the top, but the lower part requires a meticulously accurate fit.

Just as previously mentioned the hydraulic cylinder or casing *c* is held in the top cap by lugs *l* and, because the packing normally has a long life, the oil pipe connection *o* is placed on the top of the casing, as renewing of the packing is not frequent. The design is very simple, but its internal dimensions must be machined exactly. Moreover the hydraulic fluid must be carefully filtered.

SOLUBILITY OF PURE SUCROSE IN WATER

By D. F. CHARLES

(Technical Department, California and Hawaiian Sugar Refining Corporation, Limited, Crockett, Calif., U.S.A.)

Abstract

BECAUSE of conflicting data in the literature new values for the solubility of pure sucrose in water have been determined. Vials containing sucrose crystals and sugar solution were rotated in a constant temperature bath. Portions of mother liquor were extracted at intervals to read the concentration on a Bausch and Lomb Precision Sugar Refractometer.

The following formula expresses the solubility S in % solids by weight as a function of temperature, t, in °C:

$S = 64{\cdot}397 + 0{\cdot}0725t + 0{\cdot}0020569t^2 - 9{\cdot}035 \times 10^{-6}t^3$

Results of other investigators are compared with the new data.

Introduction

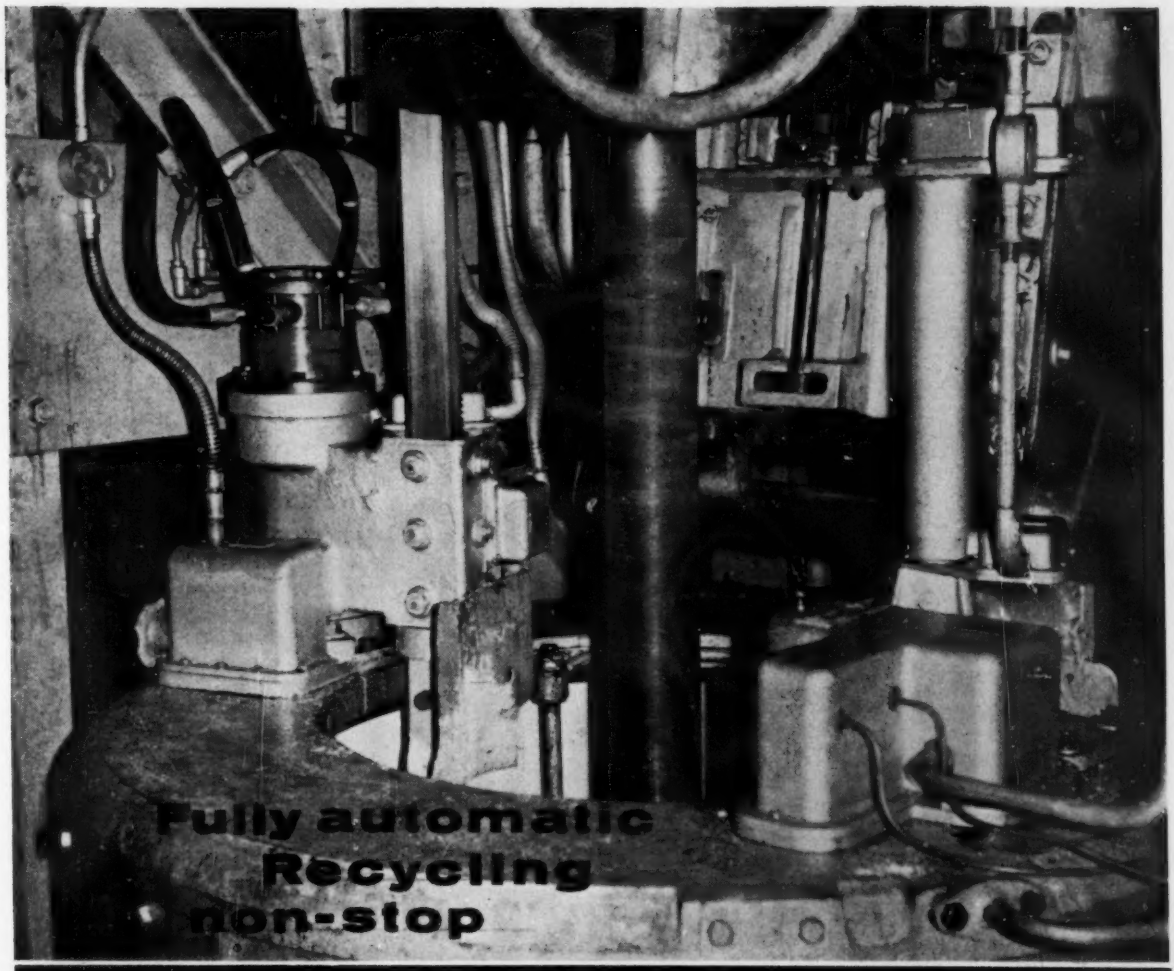
In the course of studies on the saturation temperatures of refinery products the uncertainty in the data for solubility of pure sucrose in water was noted. Since the solubility of pure sucrose is the reference basis in expressing the solubility of sugar in impure solutions, it seemed desirable to establish more precisely the basic temperature-concentration curve for pure sucrose. It appeared that it should be easy to find the equilibrium point in the room temperature range and to confirm results by approaching from both above and below saturation concentration. Tests made near 20°C were so successful that the range of temperatures was extended down to 0°C and up to 85°C.

Equipment and Materials

Figure 1 shows the basic equipment used. A frame held a rotating wheel to which rubber-stoppered glass vials could be fastened with rubber bands. By means of a set of pulleys and small belts, a gear-reduction motor drove the wheel at about 1 r.p.m. keeping the vials turned end-over-end. This turning caused seed crystals to remain continuously suspended in the mother liquor in the vials.

Water was pumped from a Precision Scientific Company constant-temperature circulating water bath (Cat. No. 66600) into the large Pyrex jar shown. From the jar it was returned to the insulated bath by siphoning through a large rubber hose. During a period of an hour or two, temperature fluctuations were smaller than $\pm 0{\cdot}05$°C. Over periods of several hours, however, the temperature drifted by amounts up to 0·3°C, making results of extended time tests less reliable. The lower temperatures were obtained by melting ice in the Pyrex jar while still using the Precision bath for control.

Temperatures were determined using glass thermometers compared against two total immersion, NBS-certified thermometers whose readings were in mutual agreement. The temperature error in the



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final results should be no greater than 0·05° between 10 and 30°C. Moreover, it should not be over 0·2°C at the top end of the scale where some difficulty was experienced in reading the NBS thermometers under total immersion conditions.

For measuring mother liquor concentration, a Bausch and Lomb Precision Sugar Refractometer (Model 33–45–01, Series 719, Serial No. XD 7176) was used. Corrections to the refractometer readings were applied based on a concurrent calibration of the refractometer using measured weights in air of sugar and water[1]. The chief limitation to extending the solubility curve to higher temperatures was the difficulty in obtaining satisfactory refractometer readings above about 80% solids.

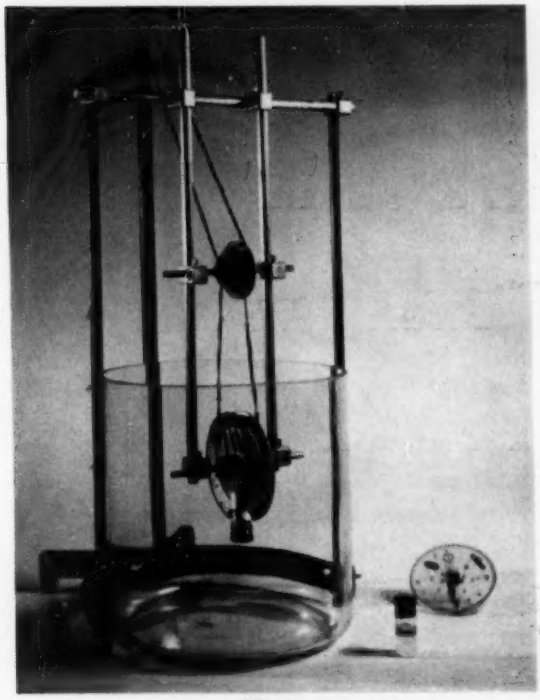


Fig. 1.

The sugar used in the test solutions was a commercial product, Confectioners Sanding Sugar, boiled from a high-purity char-filtered liquor and was the purest sugar readily obtainable. Ash content was less than 0·003%. Invert sugar content was about 0·001%. This sanding sugar was used for seed crystals also. However, only the fraction through 28 mesh and retained on 32 mesh was used for this purpose.

Procedure

In the usual procedure a number of vials were started simultaneously, each containing the same definite weight of uniform sized crystals and the same definite volume of mother liquor known to be undersaturated with respect to the bath temperature to be employed. At intervals a single vial was removed from the wheel, (simultaneously the bath temperature was noted) and was stood upright in a basket immersed in the bath to let the crystals settle. After settling, the vial was removed from the bath and the clear supernatant mother liquor was drawn off with an eye dropper for a refractometer reading. By removing vials at various time intervals, progressively farther apart, the approach to constancy of the mother liquor concentration could be observed

Direction and Rate of Approach to Equilibrium

The original plan was to start two sets of vials at the same time for each temperature, one undersaturated and the other oversaturated. The approach to equilibrium would be plotted and the saturation value obtained as the common concentration reached by both sets of solutions. Under the conditions employed however, the rates of approach to equilibrium from above and below were of different order of magnitude. From undersaturation, the solutions reached constancy within one to three hours. The supersaturated solutions, on the other hand, were still decreasing in concentration after two or three days time. Thus, rate of crystallization appeared to be extremely slow at concentrations just slightly supersaturated. (Some researchers have suggested that there may be a limiting condition such that supersaturated solutions will not reach the same value as from undersaturation[2]. The present tests gave no positive evidence on this point since the approach from above generally came within 0·1% solids of that from below and fluctuations in temperature over the long periods of time involved, as well as refractometer error, made it uncertain whether changes were still occurring.) Figure 2 demonstrates this difference in rate of approach.

In practice the points establishing the solubility curve were based on approach from undersaturation since the temperature could be held constant within ±0·05°C during the time required to assure that a constant value of mother liquor concentration was obtained. When successive refractometer readings became constant for a half hour to an hour, this was taken as the equilibrium value. Enough runs were made from the supersaturated side to indicate that these solutions, too, if given enough time, would come to the same values as obtained for the undersaturated solutions for the same temperature. Table 1 compares results obtained by approach from both directions. The time for approach from below is not listed, but in all cases was less than three hours.

For the solutions which were heated significantly in determining solubility, reducing substances were measured using Striegler's[3] method. The sample heated to 86·1°C had 0·07% invert on solids. Other solutions had less than 0·02% invert. Thus, decomposition appeared negligible.

Table 1

COMPARATIVE SOLUBILITY FIGURES AS APPROACHED FROM ABOVE AND BELOW SATURATION CONDITIONS.

Temp C°	*% Solids From Below*	*% Solids From Above*	*Difference*	*Hours Time Allowed From Above**
15·25	65·95	66·13	0·18	75
29·37	68·07	68·15	0·08	75
33·45	68·84	68·88	0·04	20
42·9	70·58	70·61	0·03	26
46·2	71·29	71·29	0·00	16

* Time from below was less than 3 hours in all cases.

the following least squares equation was calculated.

$$S = 64{\cdot}397 + 0{\cdot}07251t + 0{\cdot}0020569t^2 - 9{\cdot}035 \times 10^{-6}t^3 \quad \ldots\ldots (1)$$

where S = % sucrose and t = temp., °C

The third power term is very highly significant.

The % solids values obtained from the equation are compared with observed % solids in Table 2. The standard error of the residual deviations from the curve is 0·021% solids.

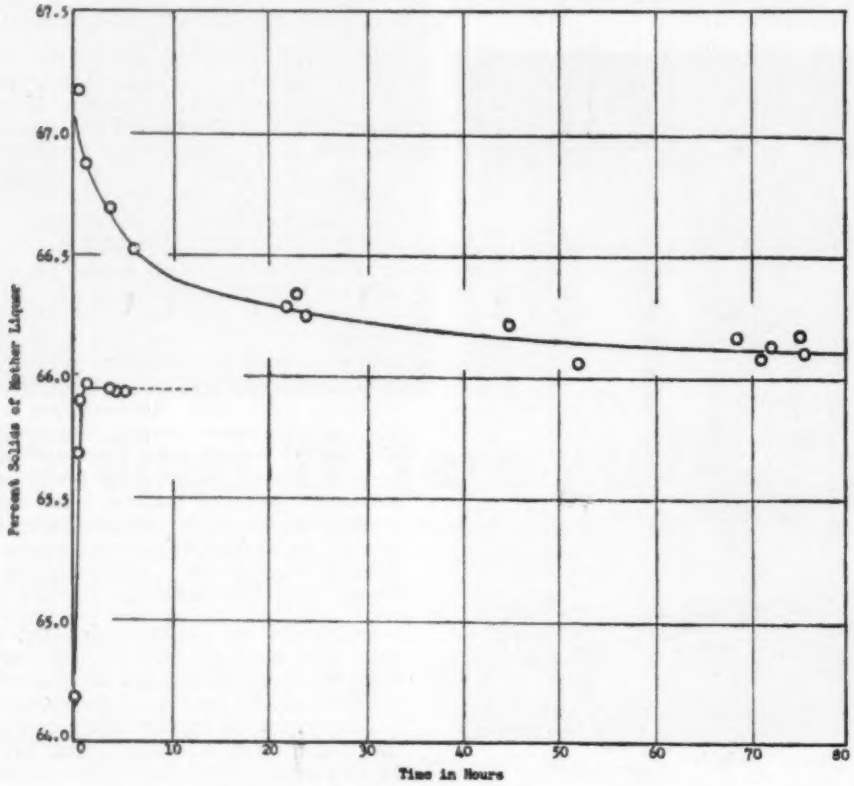


Fig. 2. Approach to equilibrium from above and below saturation at 15·25°C

SOLUBILITY RESULTS

Table 2 shows the experimental results. Each point represents an average of observations of temperature and % solids from 2 to 5 (generally 3 or 4) different vials. The results of refractometer calibration using known weights were employed in correcting refractometer readings[1]. The % solids is in terms of weights of sucrose and water in air rather than in vacuo.

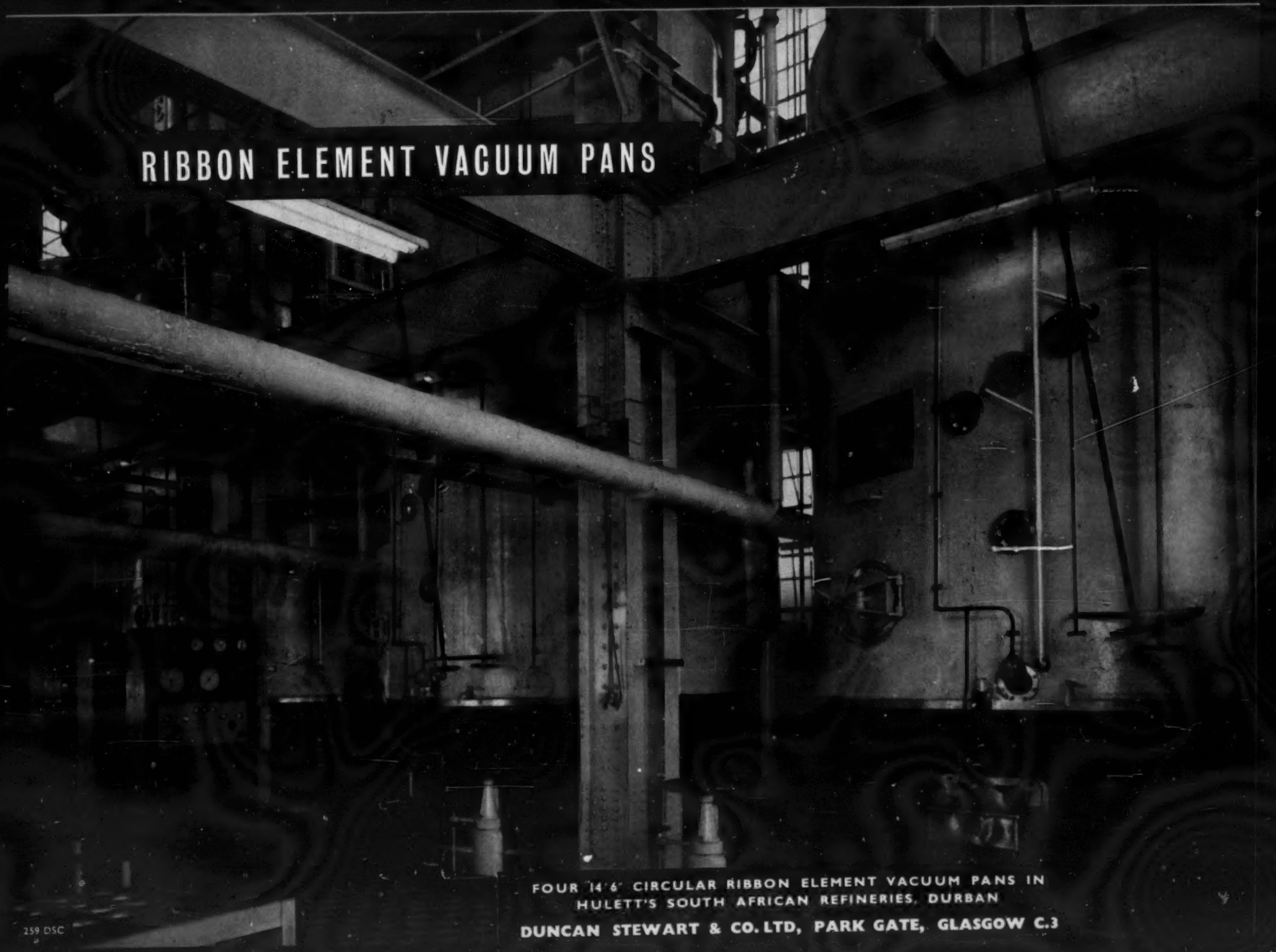
From the measured data shown in Table No. 2,

Table 2

SOLUBILITY OF SUCROSE IN WATER SHOWING DEVIATIONS OF OBSERVED POINTS FROM THE EQUATION :

$$S = 64{\cdot}397 + 0{\cdot}07251t + 0{\cdot}0020569t^2 - 9{\cdot}035 \times 10^{-6}t^3$$

	Measured Temperature in °C*	*Measured* % Solids*	*Calculated % Solids*	*Observed Minus Calculated % Solids*
1....	0·6	64·43	64·441	—0·011
2....	3·2	64·65	64·650	0·000
3....	7·0	65·02	65·003	+0·017
4....	9·4	65·24	65·253	—0·013
5....	11·8	65·52	65·524	—0·004



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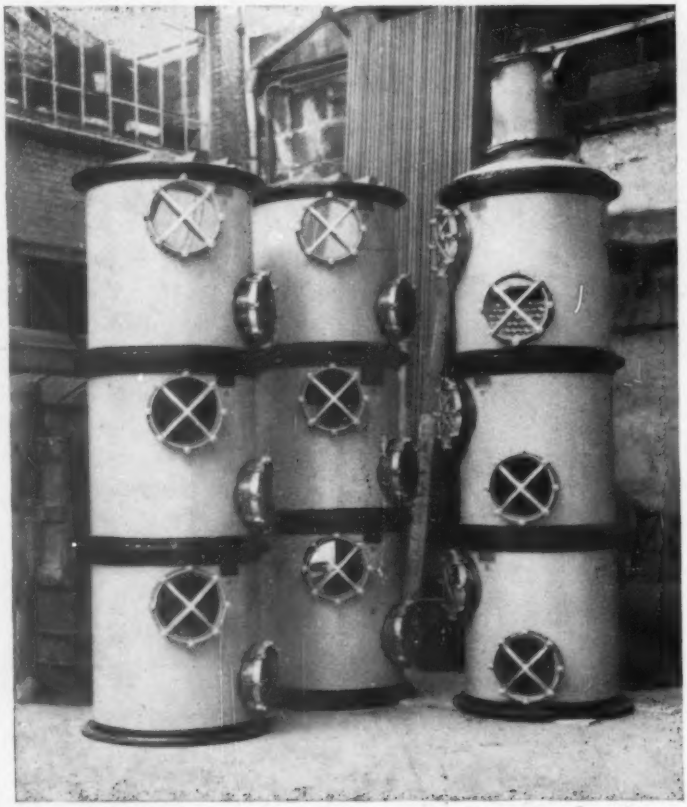

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	Measured Temperature* in °C	Measured* % Solids	Calculated % Solids	Observed Minus Calculated % Solids
6....	15·2	65·93	65·942	—0·012
7....	17·6	66·28	66·261	+0·019
8....	20·1	66·64	66·612	+0·028
9....	20·3	66·65	66·641	+0·009
10....	21·0	66·77	66·743	+0·027
11....	22·2	66·93	66·922	+0·008
12....	24·0	67·18	67·197	—0·017
13....	26·4	67·55	67·579	—0·029
14....	28·2	67·84	67·875	—0·035
15....	29·4	68·07	68·077	—0·007
16....	30·1	68·17	68·198	—0·028
17....	30·1	68·20	68·198	+0·002
18....	33·4	68·82	68·777	+0·043
19....	34·7	69·00	69·012	—0·012
20....	38·0	69·63	69·626	+0.004
21....	40·2	70·09	70·049	+0·041
22....	42·9	70·57	70·581	—0·011
23....	46·2	71·24	71·246	—0·006
24....	46·4	71·27	71·286	—0·016
25....	49·8	71·99	71·993	—0·003
26....	51·7	72·38	72·396	—0·016
27....	54·8	73·06	73·061	—0·001
28....	57·1	73·58	73·561	+0·019
29....	60·8	74·35	74·379	—0·029
30....	64·0	75·11	75·095	+0·015
31....	67·4	75·88	75·862	+0·018
32....	68·9	76·20	76·203	—0·003
33....	73·6	77·30	77·274	+0·026
34....	77·2	78·07	78·097	—0·027
35....	79·8	78·68	78·690	—0·010
36....	82·6	79·35	79·328	+0·022
37....	86·1	80·11	80·121	—0·011
			Standard Error....	±0·021

* Observed temperatures were estimated to two decimal places, % Solids to three. To simplify calculation, temperatures were adjusted to the nearest tenth with a corresponding adjustment in % solids followed by rounding to two decimal places.

Table 3 shows % sucrose and ratio of sucrose to water for 1°C steps in the range from 0° to 90°C as given by Equation 1.

Following KAGANOV[4], equations analogous to those used to represent vapour pressures were fitted to the present data :

$$\log s/w = 11{\cdot}728625 + 356{\cdot}6669\,(1/T) - 7{\cdot}2247625 \log T + 0{\cdot}017665687T \quad ..(2)$$

and

$$\log x = -30{\cdot}758231 + \frac{1348{\cdot}7858}{T} + 9{\cdot}7335314 \log T + 3{\cdot}825669 \times 10^{-3}T \quad ..(3)$$

where

s/w = ratio of sucrose to water
x = mole fraction of sucrose
T = absolute temperature, °Kelvin

The last term in Equation 2 was significant at the 0·1% level, the last term in Equation 3 at the 5% level. Standard error of the residuals was about the same as for Equation 1. Thus, since all equations were similar in complexity and residual error, the more common form of Equation 1 was employed in computing the data of Table 3. Equations 2 and 3 may also be of theoretical interest in terms of attempts to extrapolate to the eutectic or to the melting point of sucrose.

Table 3

SOLUBILITY OF PURE SUCROSE IN WATER CALCULATED FOR UNIT INCREMENTS OF TEMPERATURE FROM THE EQUATION

$$S = 64{\cdot}397 + 0{\cdot}07251t + 0{\cdot}0020569t^2 - 9{\cdot}035 \times 10^{-6}t^3$$

t Temp. °C	S % Sucrose By Weight (in air)	Sucrose per 100 of Water	t Temp. °C	S % Sucrose By Weight (in air)	Sucrose Per 100 of Water
0....	64·40	180·9	45....	71·00	244·8
1....	64·47	181·5	46....	71·20	247·3
2....	64·55	182·1	47....	71·41	249·8
3....	64·63	182·7	48....	71·62	252·3
4....	64·72	183·4	49....	71·83	254·9
5....	64·81	184·2	50....	72·04	257·6
6....	64·90	184·9	51....	72·25	260·3
7....	65·00	185·7	52....	72·46	263·1
8....	65·10	186·6	53....	72·67	265·9
9....	65·21	187·5	54....	72·89	268·8
10....	65·32	188·4	55....	73·10	271·8
11....	65·43	189·3	56....	73·32	274·8
12....	65·55	190·3	57....	73·54	277·9
13....	65·67	191·3	58....	73·76	281·1
14....	65·79	192·3	59....	73·98	284·3
15....	65·92	193·4	60....	74·20	287·6
16....	66·05	194·5	61....	74·42	291·0
17....	66·18	195·7	62....	74·65	294·4
18....	66·32	196·9	63....	74·87	297·9
19....	66·45	198·1	64....	75·09	301·5
20....	66·60	199·4	65....	75·32	305·2
21....	66·74	200·7	66....	75·54	308·9
22....	66·89	202·0	67....	75·77	312·7
23....	67·04	203·4	68....	76·00	316·6
24....	67·20	204·8	69....	76·22	320·6
25....	67·35	206·3	70....	76·45	324·7
26....	67·51	207·8	71....	76·68	328·8
27....	67·68	209·4	72....	76·91	333·1
28....	67·84	211·0	73....	77·14	337·4
29....	68·01	212·6	74....	77·36	341·8
30....	68·18	214·3	75....	77·59	346·3
31....	68·35	216·0	76....	77·82	350·9
32....	68·53	217·7	77....	78·05	355·6
33....	68·70	219·5	78....	78·28	360·4
34....	68·88	221·4	79....	78·51	365·3
35....	69·07	223·3	80....	78·74	370·3
36....	69·25	225·2	81....	78·96	375·4
37....	69·44	227·2	82....	79·19	380·6
38....	69·63	229·2	83....	79·42	385·9
39....	69·82	231·3	84....	79·65	391·3
40....	70·01	233·4	85....	79·87	396·8
41....	70·20	235·6	86....	80·10	402·5
42....	70·40	237·8	87....	80·32	408·3
43....	70·60	240·1	88....	80·55	414·1
44....	70·80	242·5	89....	80·77	420·1
			90....	81·00	426·2

KONONENKO and HERSTEIN[5] recently called attention to ORTH's formula[6] as a convenient straight line representation of the solubility of sucrose in various solvents. For the present data, however, Orth's formula would have to be expanded into a third degree polynomial to remove significant residual deviations. Similarly, a straight line formula proposed by CULP[7] does not fit the data adequately.

Literature Review and Comparison

How do the results described above compare with those obtained by other researchers? Table 4 lists the major experimental results[6–28]. Figure 3 shows results of several investigators in terms of deviations from Equation 1 of the present paper.

In 1892 Herzfeld[6] published his observations of sugar solubility for the range from 5 to 100°C. The smooth curve, calculated from his six points, was accepted for many years as the best representation of the solubility of sucrose. For example, Table 20 in Spencer and Meade's Handbook[27] is calculated from Herzfeld's formula.

A primary criticism made by other investigators of Herzfeld's derived curve arises from the fact that no measurements were made between 60°C and near 100°C. Below 60°C the mean interval between analytical points was about 15°C. Then the interval jumped to 40°C in what is the most critical region for sugar boiling control.

Taylor[22] has pointed out the unreliability of determinations at 100°C, saying that inversion occurs rapidly about 85°C. It is possible that invert sugar in the Herzfeld samples at 99·54°C depressed the polarization so that a low figure was obtained for per cent solids.

Figure 3 shows that, in the low temperature range, Herzfeld's saturation concentrations are higher than almost all later work. Of his five lowest points, only that at about 19°C was approached from supersaturation. This shows a deviation from the present data of about the same order of magnitude as errors which have since been discovered in the refractive index and polariscope scales. Values at 5°, 29°, 49° and 59° were approached from oversaturation. Since Herzfield's tests were completed in a matter of hours and the present work indicates that several days are required to reach equilibrium, these solutions may have remained supersaturated, giving high results.

Comparison of the data in Table 4 shows differences between results of various investigators which often are larger than normal expectations. However, the present data are in fair agreement with those of several of the more recent investigators as Figure 3 shows.

Vernon[16] in connection with studies on the rate of crystallization reported solubilities which are in fair agreement with the present.

In 1947, Taylor[23] published results of her careful investigations in the limited range from 64°C to 82°C. The present data agree quite well with Taylor's. The largest difference occurs near 81°C where Taylor reported 0·5 to 1·0% invert. A 1% invert content would increase the observed saturation concentration by about 0·1% solids.

Wise and Nicholson[25] published their curve of solubility in 1955. Although their original 59 obser-

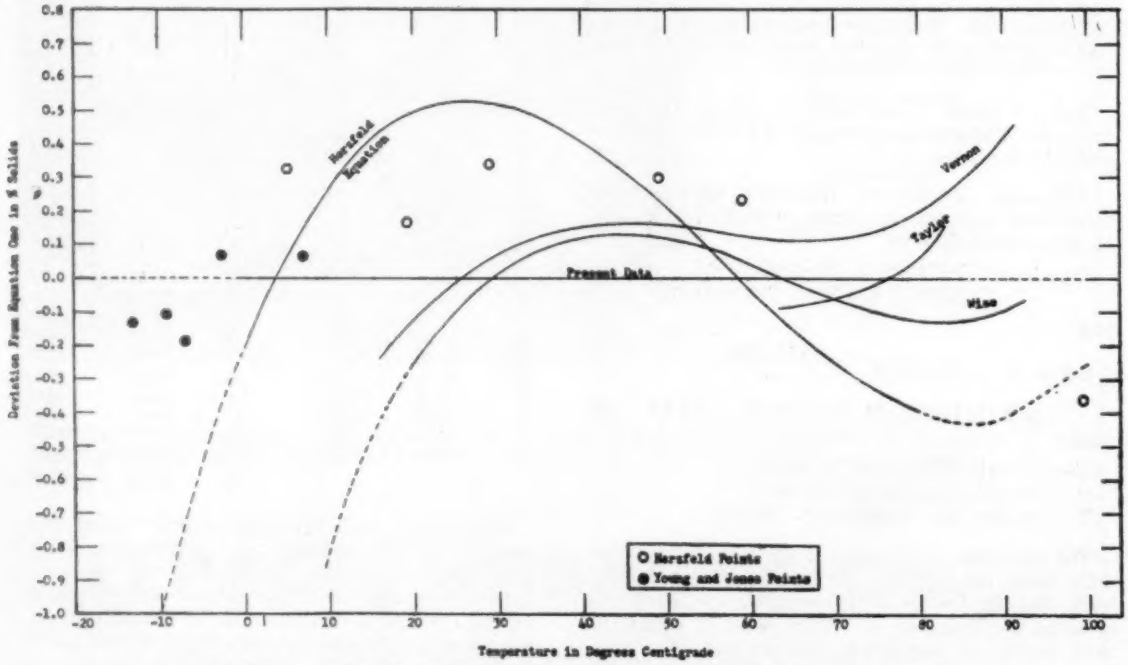

Fig. 3. Solubility results of various researchers; reference or zero line represents equation (1)
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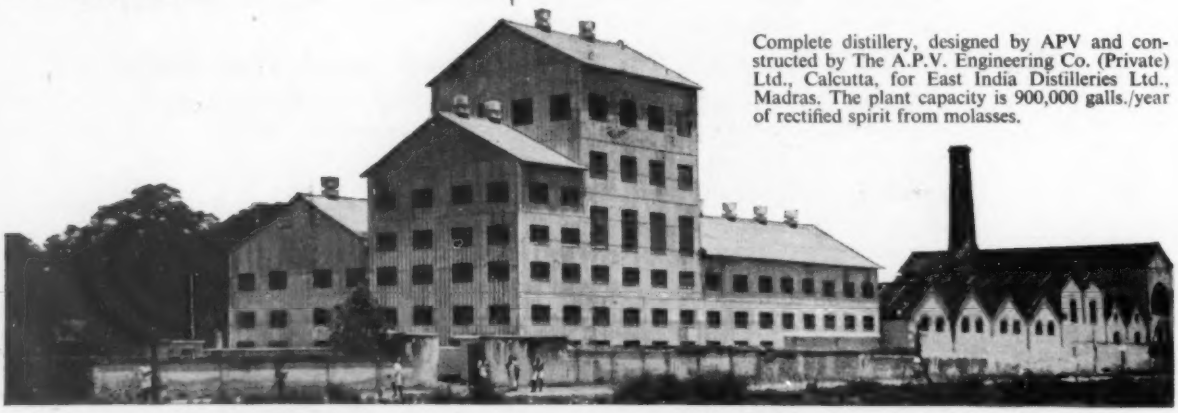

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vations were not included in Table 4, Figure 3 shows their calculated curve. This curve is lower than Herzfeld's at about 55°C and crosses Taylor's at about 70°C. Wise's curve agrees well with the present data except below about 25°C.

Table 4

SOLUBILITY DATA OF DIFFERENT OBSERVERS

t	S
HERZFELD—1892[9]	
5·2	65·17
19·15	66·65
28·8	68·31
49·53	72·23
59·4	74·33
99·45	82·78
LEBEDEFF—1908[9]	
30·0	68·54
50·0	72·53
70·0	76·76
KREMANN & EITEL—1923[10]	
14·5	62·5
0	63·1(?)
16	66·1
MONDAIN-MONVAL—1924[11]	
0·9	64·35
15·8	66·22
25·6	67·79
30·5	68·55
JACKSON & SILSBEE—1924[12]	
23·15	67·59
30·0	68·11
50·0	72·25
GRUBE & NUSZBAUM—1928[13]	
0	64·21
25	67·98
35	69·50
50	72·25
75	77·24
90	80·61
100	82·96
NISHIZAWA & HACHIHAMA —1929[14]	
25	67·32
45	71·05
75	78·58
GRUT—1936[15]	
20	66·80
30	68·55
40	70·44
50	72·47
60	74·60
80	79·13
VERNON—1938[16]	
17·6	66·13
24·7	67·24
28·4	68·00
30·4	68·26
39·1	70·11
42·0	70·52
46·1	71·39
52·6	72·66
59·5	74·20
65·0	75·45
73·2	77·39
75·6	77·92
83·2	79·63
91·1	81·71

t	S
SCATCHARD *et al.*—1938[17]	
25	67·45
D'ORAZI—1938[18]	
40	70·41
50	72·30
70	76·53
80	78·90
90	81·24
HRUBY & KASJANOV—1939[19]	
50	72·22
80	78·86
VERHAAR—1940[20]	
30 Range	{68·32 / 68·62
BENRATH—1942[21]	
107	84
115	86
122	88
130	90
136	92
144	94
TAYLOR—1947[22]	
64·13	75·036
63·98	75·047
64·15	75·050
68·28	76·010
71·23	76·699
71·51	76·730
71·42	76·740
71·40	76·747
76·72	77·994
81·42	79·144
81·39	79·172
YOUNG & JONES—1949[23]	
6·05	64·9
—2·3	64·3
—7·05	63·8
—9·25	63·8
—13·05	63·65
DUBOURG *et al.*—1952[24]	
87·16	80·00
WISE & NICHOLSON—1955[25]	
See Text	
KELLY—1958[26]	
0·0	64·53
20·0	66·90
35·0	69·27
50·0	72·25
75·0	77·51
100·0	82·49
188	100·0

With regard to the region below 0°C there are some puzzling differences. KREMANN and EITEL[10] results, reported at 0°C, appear to be in error. They extrapolated the sucrose curve to their ice curve and obtained —14·5°C and 62·5% solids for the eutectic points. They pointed out that a value of the eutectic given by GUTHRIE[28] as —8·5°C and 50·3% solids lies on their ice curve but appears to be grossly in error as representing the eutectic.

In 1949 YOUNG and JONES[23] studied the low temperature phase transformations of sucrose and water finding evidence of several hydrates. It is possible that the complexity of phase forms at low temperatures is partially accountable for the variety of results reported by different investigators. The present data fall in line with those of YOUNG and JONES who gave —13·95°C and 63·6% solids for the eutectic.

CONCLUSION

While there are still many things unexplained about differences between investigators, nevertheless, it still appears that the present curve is a good overall representation of the solubility. The new curve is in fair agreement with work of TAYLOR, of WISE and NICHOLSON, and of VERNON, and also ties in with that of YOUNG and JONES at the low end. Further, the good reproducibility of results is illustrated by the smallness of the deviations of observations from the smoothed solubility curve.

REFERENCES

1. CHARLES: *I.S.J.*, 1959, **61**, 236.
2. VANHOOK: *Compt. Rend. 7th Assembly C.I.T.S.*, 1953, 30.
3. BATES and JACKSON: *Nat. Bureau Standards Sci. Paper*, 1916, (268), 80.
4. *Sakhar. Prom.*, 1949, **23**, (2), 27.
5. *Chem. & Eng. Data Series*, 1956, **1**, 87.
6. *Bull. Assoc. Chim. Sucr. Dist.*, 1913, **31**, 94.
7. *Sugar*, 1957, **52**, (3), 45.
8. *Zeitsch. Ver. Rübenzucker-Ind. Deutsch.*, 1892, **42**, 177–181, 232–240.
9. *Zeitsch. Ver. Deutsch. Zuckerind.*, 1908, **58**, 599.
10. *Rec. Trav. Chim.*, 1923, **42**, 539.
11. *Compt. Rend.*, 1925, **181**, 37.
12. *Nat. Bureau Standards Technologic Paper*, 1924, (259).
13. *Zeitsch. Elektrochem.*, 1928, **34**, 91.
14. *Ibid.*, 1929, **35**, 385.
15. *Listy Cukr.*, 1940, **56**, 53; *Z. Zuckerind. Czech. Rep.*, 1937, **61**, 356.
16. Velocity of Crystallization of Sucrose. (Ph.D. Thesis, Univ. London), 1939, 112.
17. *J. Amer. Chem. Soc.*, 1938, **60**, 3061.
18. *Ind. Sacc. Ital.*, 1938, **31**, 401.
19. *Z. Zuckerind. Czech. Rep.*, 1939, **63**, 187, *I.S.J.*, 1940, 42, 21.
20. *Archief.*, 1940, **1**, 324.
21. *Z. Anorg. Allg. Chem.*, 1942, **249**, 245.
22. *J. Chem. Soc.*, 1947, 1678; *I.S.J.*, 1948, **50**, 292.
23. *J. Phys. Colloid Chem.*, 1949, **53**, 1334.
24. *Sucr. Franc.*, 1952, **93**, (6), 121.
25. *J. Chem. Soc.*, 1955, 2714.
26. *Sugar J. (La.)*, 1958, **20**, (1), 14.
27. Cane Sugar Handbook, 18th Ed. (Wiley, New York.) 1945. p. 217.
28. *Phil. Mag.*, 1867, **2**, 216.

Rapid deterioration and destruction of blackstrap molasses in storage. G. FROMEN and E. BOWLAND. *Sugar J.* (La.), 1959, **22,** (4), 20–27.—See *I.S.J.*, 1956, **58,** 72.

* * *

The use of louvres in calandria type vacuum pans. J. H. BARKLEY. *Sugar J.* (La.), 1959, **22,** (4), 30–31.—The advantages of the Honolulu Iron Works Co. design of vacuum pan are described, the stepped louvres mounted above the downtake promoting better circulation and increasing pan capacity.

* * *

Central control, automatic operation feature Toronto Redpath. J. A. SWAN and J. D. LEWIS. *Sugar y Azúcar,* 1959, **54,** (10), 38–47.—A very detailed description is given of the design, erection and equipment of the Redpath refinery[1], Toronto, of Canada & Dominion Sugar Co. Ltd., which is a plant of 2800 short tons/week melting capacity with the possibility of easy expansion to 5600 and later 11,200 tons/week. It employs the carbonatation-char purification system in use at Montreal and the Tate & Lyle refineries and has been designed for complete automatic control of some equipment, while others are provided with manual or semi-automatic control for conversion to fully automatic as experience dictates.

* * *

500-ton turbine driven mill at Villanueva. J. M. SANTIAGO. *Sugar y Azúcar,* 1959, **54,** (10), 52–54.—A description is given of a 500-ton cane sugar factory erected in Honduras. It is to have an eventual capacity of 1200 tons, and is provided with a mixed Service Foundry-Dibert, Bancroft & Ross tandem driven by a 600 h.p. Worthington turbine. Juice is continuously treated with a solution of SO_2, "dry sugar acid" (a dry form of phosphoric acid supplied by Victor Chemical Co.), and lime, and after a retention time of 25 minutes is heated and sent to the clarifier, the muds being filtered directly in a "Fas-Flo" leaf filter to give a clear juice superior to that from the clarifier. The juice is evaporated in a quadruple-effect and sent to the pans.

* * *

Evaporator scale is a sugar house processing problem in the Florida Everglades. B. A. BOURNE and P. S. FRANCIS. *Sugar J.* (La.), 1959, **22,** (5), 23–27.—The heavy scale formation in U.S. Sugar Corp. evaporators in Florida is a result of the high Ca content of the juices, which in turn results from the high Ca content of the soil, and the high juice phosphate which requires more lime for its elimination than in Louisiana. Removal of scale—largely a hard $CaSO_4$—was examined with a view to reducing the expensive corrosion of the iron bodies on boiling with acid. A process was developed and includes: boiling with 10% NaOH for 3 hr; rinsing; boiling for 3 hr with 6–7% sodium bicarbonate solution containing 0·05% of "Triton X-114", a wetting agent; rinsing; and soaking in 3–5% HCl at room temperature until no further reaction is visible. The $NaHCO_3$ converts the $CaSO_4$ to $CaCO_3$ which is removed in the cold by the acid while the iron is less readily attacked. If any scale remains, the whole process is repeated. The evaporators were found to last 11·9% longer between cleanings, the caustic soda treatment took 55·5% less time and 22·2% less HCl was required, while the acid treatment time was cut by 62·4%. The extra cost of chemicals ($NaHCO_3$ and "Triton X-114") is amply covered by the reduced corrosion, so that a net saving of $37,000 is estimated.

* * *

Vapour and drainage system bleeding for condensate at S.A.I.S. (Società Agricola Italo-Somalia) factory. C. G. M. PERK. *S. African Sugar J.*, 1959, **42,** 891–893.—Because of high fuel costs, a high degree of heat economy is essential and is achieved by vapour bleeding for juice heating and boiling, and installation of economically operating prime movers including a drop valve engine for mill drive and a low steam rate turbine in the power house. Details are given of the juice and syrup heating by means of 1st, 2nd and 3rd vapour, and of boiling with 1st and 2nd vapour. Under each vessel of the evaporator is a well-lagged closed container for condensate from the vessel and also from the heaters and pans using the same vapour. The exhaust steam condensate plus that from the second vessel are used as boiler feed, at above 220°F. Special attention to the venting of incondensable gases is required where there is extensive vapour bleeding and this is discussed.

* * *

Affination of granulated sugar products in sugar refining. D. U. UMAROV and I. F. ZELIKMAN. *Izvest. Vysshikh Ucheb. Zavedenii, Pishchevaya Tekhnol.*, 1959, (2), 121–127.—The theory of affination is discussed, and results given of laboratory tests, in which 1st and 2nd product sugar was mixed with a 71–72°Bx syrup at 40°C during 5–30 min and was centrifuged at 2500 r.p.m. for 3–4 min. In 5-stage affination the first two stages were the most effective, while even the 3rd stage improved sugar quality. Washing with a 65–72°Bx green syrup increased sugar yield. Lower purity 1st product massecuite should be washed with 2nd product, then with 1st product green syrup; 2nd product sugar should be washed with heavy and light 1st product syrups.

[1] *See also I.S.J.*, 1959, **61,** 63, 290.

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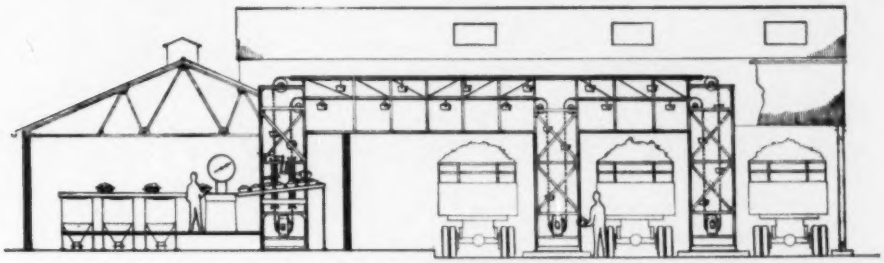

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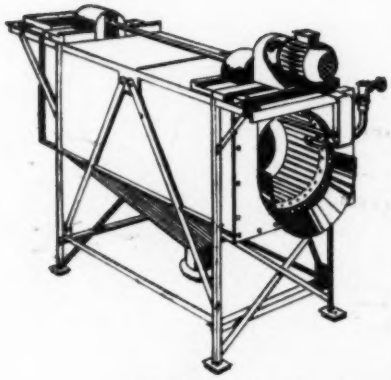

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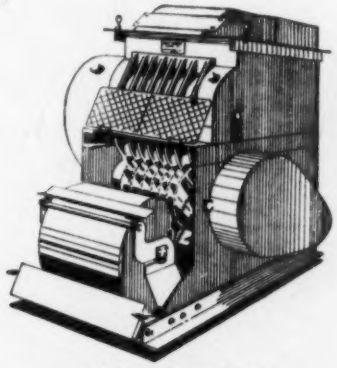

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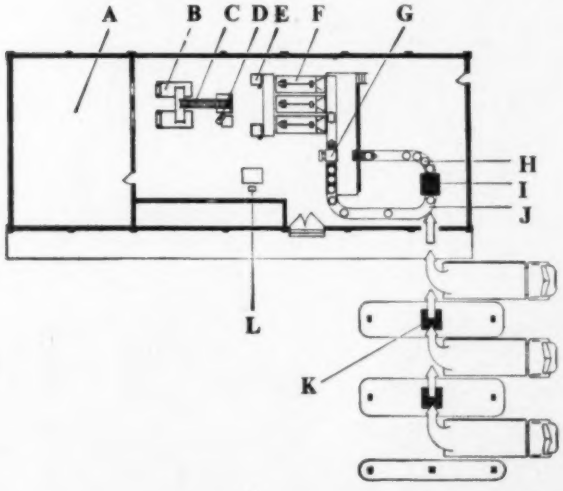

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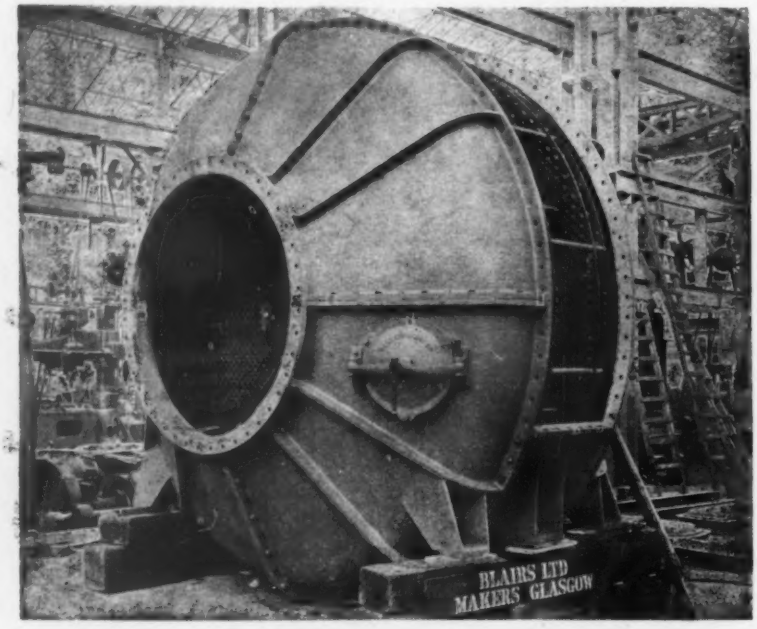

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The progress of bulk sugar handling. R. W. BARTON. *Sugar J.* (La.), 1959, **22,** (6), 23–28.—A review is presented of the history of bulk handling of sugar, with reference to the installations existing and planned in Hawaii, the U.S., Puerto Rico, Dominican Republic, Cuba, Jamaica, Virgin Islands, Mauritius and Réunion, British Guiana, Philippines and Australia.

* * *

Clarification efficiency. S. G. PRASAD and K. N. AGARWAL. *Indian Sugar*, 1959, **9,** 325–327.—The effect of sucrose loss in filter cake on the value of the clarification factor [(mixed juice non-sugars—clear juice non-sugars)/mixed juice non-sugars] is pointed out and illustrated by examples.

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Equipment of the Canton sugar factory. J. MLYNÁR. *Czech. Heavy Industry*, 1959, (12), 25–33.—In Canton province the cane varieties grown are principally POJ 2878, POJ 3016, F 108 and F 134. Cane is harvested from the beginning of November to the end of April, peak maturity occurring between March 20th and April 20th. A new factory called Hwa-Tsiau ("Gift of Heaven") of 2000 tons/day capacity was installed by Škoda Works during the four months from October 1957 and reached its guaranteed performance in March 1958. Cane is delivered by barge and tugs (averaging 20-ton loads) and is unloaded in 3–4 ton bundles by two derrick cranes on to weighing scales. The cane is tipped onto the auxiliary carrier which is electrically driven at a remote-controlled variable speed, and passes through a set of electrically operated cane knives. It passes onto the main carrier and through a second set of knives before entering the tandem by way of a magnetic separator for tramp iron. This tandem comprises five mills, individually driven by 300 kW 5000 r.p.m. steam turbines through a 1000: 35 speed reduction gear box and 6:1 spur gears. The mills are provided with 34 × 72 inch rollers with grooving of $1\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{2}$ inch pitch, hydraulic loading of the top rollers, and force-feed lubrication of the journals. The turbines are designed for 25 atm absolute pressure with steam of 300°C superheat and a back pressure of 3 atm absolute, and are protected by various overload, etc., devices. Juice is sent to automatic scales while bagasse passes to the boilers, excess being stored and baled before being sent to a cellulose plant. The boiler house contains four Škoda boilers with a maximum output of 18 tons of steam per hr at a working pressure of 25 atm gauge and 310° superheat. A turbogenerator provides 2140 kVA at 400/231 V, 50 c/s and a power factor of 0·75. The juice is heated and treated with about 1·5% of lime and undergoes double carbonatation. After settling it is sulphited and passed to the quadruple effect while the muds are filtered in two continuous vacuum filter presses of 36 sq.m. filter surface. Syrup of 60°Bx is boiled in four calandria pans and one coil pan, the latter being used for preparation of seed for 1st and 2nd boilings. The C-massecuite crystallizers are provided with the Škoda disc cooling system. The nine A– and five B– centrifugals are of the suspended Western States type, with pneumatic control of washing, spinning, braking, etc., but charging is manually controlled. C-massecuite is cured in seven 1500 r.p.m. 48-inch machines. Sugar is bagged and stored in a godown where conveying and stacking is highly mechanized.

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Versatile process controller cuts sugar losses. E. D. GILLETTE. *Sugar y Azúcar*, 1959, **54,** (12), 30–32.—Evaporator condensates and condenser waters at Refined Syrups & Sugars Inc. are continuously monitored for sugar content by the "AutoAnalyzer" developed by Technicon Controls Inc., of Chauncey, N.Y., U.S.A. This equipment draws a continuous sample and simultaneously introduces precisely-proportioned amounts of the appropriate chemical reagents. A continuous dialyser removes interferences present in the sample stream which passes to a constant temperature bath where inversion and other reactions occur. The optical density of the stream is measured and recorded on a strip chart, an audible alarm being sounded if the level exceeds 40 p.p.m. sucrose.

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Photometric method of control and automation of the boiling of refinery massecuites. S. V. DYKHNE and A. YU. ZUBOV. *Sakhar. Prom.*, 1959, (10), 39–40.—A proposed scheme of boiling control employs a light source inside the pan on the wall opposite the sight glass and a photocell outside the glass. Until nucleation the photocell will receive strong light from the light source and will transmit maximum photocurrent to a microammeter. On nucleation, the light rays will start to dim and the photocurrent will weaken correspondingly. Thus the photocurrent will give a guide to the amount of crystals. A saturated sugar solution was placed in a glass cuvette and different amounts of seed were added. The intensity of the light shining through the cell was determined from the photocurrent readings. A graph of the results, giving the % crystals *vs.* current intensity agrees with the Lambert-Beer law of light absorption. The shadow effect is not only dependent on the amount of crystals but also on their size, the smaller crystals reducing the light more than the larger.

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Enterprise factory rebuilt in only six months. ANON. *Sugar J.* (La.), 1959, **22,** (6), 13–14.—Enterprise factory in Louisiana was almost completely destroyed by fire in March 1959. The insurance was inadequate but a debenture issue and loans provided the finance for a rebuilding of the plant in time for the October 1959 crop. The equipment was examined several times and unsound and damaged plant was replaced, including the factory building, evaporators, heaters, pans, clarifier, mill drive turbine, crusher engine, and intermediate carriers. Mill frames, housings and rolls were repaired, and the factory is now of 3000 tons capacity or 15% higher than before the fire.

Application of non-destructive testing methods. W. KEHR. *Rev. Agric. Sucr.* (Mauritius), 1959, **38**, 222–225.—Four methods of non-destructive materials testing are briefly discussed with their applications, namely X-ray examination, ultrasonic testing, magnetic particle inspection and dye penetration.

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A. TSINS (Central Sugar Research Institute) system discontinuous vacuum pan with sectional heating surface. M. L. VAISMAN, N. I. BURYAKOV and YU. D. KOT. *Sakhar Prom.*, 1959, (11), 33–36.—Details are given of a vacuum pan, which incorporates both a calandria and heating coils above this. A pan of 40 tons capacity has a dia. of 3·570 m, height of cylindrical part of 5·900 m, a h.s. of 238 sq.m., an overall massecuite height in the cylindrical part of 3·130 m, and a distance between the top of the coils and the massecuite of only 55 cm. The initial syrup feed is 22·4% of the total amount per boiling, instead of a normal 40–45%, the specific h.s. on massecuite is 0·595 sq.m., and the ratio of effective h.s. on initial syrup intake is 1·065 sq.m./zentner. The calandria is designed to heat the syrup until "shocking" after which the individual coils are brought into operation in sequence as the crystal grows and the massecuite level climbs. In this way, it is claimed, large and uniform crystals can be obtained, without false grain, and with subsequent good spinning and lower sugar losses; highly-concentrated syrups (including green syrups) can be boiled without water or juice additions, which would raise the steam consumption; good circulation is obtained with regular steam requirements.

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Sugar production in the Chinese People's Republic. V. N. TSYGANKOV. *Sakhar. Prom.*, 1959, (11), 72–74.—A brief review is given of the Chinese sugar industry, with illustrations of one of the largest sugar factories at Kyanming, which has a production of 360 tons of sugar per day. Until recently, the sugar industry has been restricted to the two provinces of Kwangtung (cane) and Heilungkiang (beet), and while there are over 200 mechanized factories, there are 4000–5000 very small factories processing only 4–5 tons of material per day.

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Importance of feed water in steam generation. G. RAMCHANDER. *Indian Sugar*, 1959, **9**, 383–385.—The significance of the constituents of raw water is briefly discussed and mention made of boiler feed treatment.

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Construction of sugar godowns. S. L. PHANSALKAR and N. A. RAMAIAH. *Sharkara*, 1959, **2**, 87–98.—The influence of micro-organisms, temperature and humidity on sugar deterioration in storage is briefly discussed and an account given of the construction of a godown for bagged sugar, from selection of the site, general layout, pier, wall and floor construction, plinth level, damp-proofing and separation of the bags from the floor, roof construction, lighting, doors and ventilators, stacking of bags, and drainage, to cost.

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Scheme for demineralization of sugar cane juice by ion exchange. ANON. *Sharkara*, 1959, **2**, 99–102.—A brief account is given of an investigation into ion exchange treatment of clarified cane juice to reduce molasses losses. After laboratory tests, pilot plant trials were to be carried out in the 1959/60 season. No results are recorded.

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Lubricating oil reclamation plant of T.S.C. C. H. LAN. *Taiwan Sugar*, 1959, **6**, (8), 23–25.—In an imported oil purifier, contaminated and used lubricating oil is mixed with a filter aid, agitated and heated under vacuum and filtered under pressure. Cost is NT$11.80 per gallon of clean oil, but it is hoped to reduce this by using local or Japanese filter aid, paper and fabric.

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Some fundamental considerations in the storage and transport of jaggery. P. V. SURYAPRAKAS RAO and N. V. MOHAN RAO. *Indian J. Sugarcane Res. Dev.*, 1958–59, **3**, 84–89; through *S.I.A.*, 1959, **21**, Abs. 767.—It is estimated that 55% of the annual Indian cane crop is made into jaggery, and half of this is stored for a relatively long period with losses of up to 10%. The factors leading to such losses are humidity fluctuations leading to discoloration, inversion, insect damage and microbiological deterioration. The different factors are briefly discussed and protection by humidity-controlled godowns, and by the use of waterproof packages and of fungicides is suggested.

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Utilization of an ion-exchange process in sugar refining. III. On the organic fouling of anion-exchange resins. S. IWASHINA. *J. Agric. Chem. Soc. Japan*, 1958, **32**, 876–882; through *S.I.A.*, 1959, **21**, Abs. 787. **IV. Tendencies of organic fouling on the strongly basic anion-exchange resins and its effect on inorganic salts in the sugar solutions.** *idem. ibid.*, 1958, **32**, 882–889; through *S.I.A.*, 1959, **21**, Abs. 788. **VI. On the regeneration procedures for the organic fouling of strongly basic anion-exchange resins.** *idem. ibid.*, 1959, **33**, 42–45 + 2 plates; through *S.I.A.*, 1959, **21**, Abs. 789. **VIII. The relation between the decolorizing effect and the porosity of strongly basic anion-exchange resins by using the chloride cycle.** *idem. ibid.*, 1959, **33**, 433–437; through *S.I.A.*, 1959, **21**, Abs. 790. **IX. Long-term operating characteristics of strongly basic anion-exchange resins with the use of the chloride cycle.** *idem. ibid.*, 1959, **33**, 437–444 + 2 plates; through *S.I.A.*, 1959, **21**, Abs. 791.

III. After 30–40 cycles of use, anion-exchange resins (e.g. the chloride form of an R≡NX type) decrease in decolorizing efficiency. The regeneration efficiency (%) and the ratio of organic fouling (%) were determined from the amount of adsorbed

colour material in the resin after normal NaCl regeneration and the amount of colour in the eluate, both being derived from the spectrophotometric colour index. It is considered that the fouling is caused by metal salts and organic materials firmly adsorbed within the styrene network of the resin.

IV. A closer study was made, by means of the previously described method, of organic fouling on four commercial anion-exchange resins with the use of carbonatation liquors from Cuban and Formosan raws. The degree of fouling varied with the resin, but was smaller in resins that had a lower adsorption affinity for inorganic ions.

VI. Organic fouling of the resins can be restricted by regeneration treatment of the resin or by pre-treatment of the sugar liquor. Regeneration is achieved either by the use of mineral acid and its salts, or by the use of a water-soluble hypohalite (particularly hypochlorite), which acts as a mild oxidizing agent. With the first of these methods the capacity drop of the resin on contamination was recovered in the four resins tested ("Amberlite IRA–401," "Diaron SA–101," "Duolite A–102" and "Duolite A–40"). With the use of the oxidizing system the resin exchange capacity was lowered. Photomicrographs show the appearance of the resins with the different treatments; with the hypochlorite treatment it was difficult to detect changes in the appearance other than a bleaching effect.

VIII. Divinylbenzene was added to resins during preparation to act as a "cross-linking" agent. The normal addition is 1% (by weight) of the resin, but increasing this amount to 6% decreased the leakage of SO_4'' ions into the eluate and gave poorer regeneration and decolorizing efficiencies. The best results were achieved by the addition of 3% of divinylbenzene.

IX. "Amberlite IRA–401" was used for up to 400 cycles in the purification of carbonatated juices. The resin was regenerated by either a sodium hypochlorite-hydrochloric acid technique or by acid alone. The hypochlorite (0·5% solution) and acid (3·3% solution) were used alternately. After 400 cycles, the exchange capacity of the resin was 48·7% with the combined treatment and was 56·1% with the acid treatment. Contaminations with inorganic materials, compared with a control, were +16·78% for the NaOCl-HCl method and —4·45% with the HCl alone; both regeneration techniques gave rise to an increase (determined by spectroscopic analysis) of Pb, Fe and Sn contamination, but gave rise to a decrease of Mn and Ni. The physical strength of the resins was gradually lowered, and surface corrosion of the resin particles was particularly apparent after the acid-only treatments (electron photomicrographs are given). Contamination of the resins by organic fouling was examined by infra-red spectroscopic analysis techniques. Adsorption peaks at wave number 1040 cm^{-1} suggested the presence of alcohols or ethers, at 1370 and 1600 cm^{-1} the presence of carboxyl groups, and at 1110 cm^{-1} the presence of alcohols, aliphatic aldehydes or ethers.

Complex mechanism for continuous packaging and counting of refined sugar. V. YA. BRAGINSKII. *Sakhar. Prom.*, 1959, (12), 35–36.—Some details are given with a diagram of a unit, installed in Odessa refinery, for bagging refined sugar, weighing and counting. Economies have been effected and labour efficiency has been raised.

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Automatic cutting-packaging line for (lump) refined sugar. F. I. GIRYAVENKO. *Sakhar. Prom.*, 1959, (12), 37–38.—A critical description is given of a Hesser unit for automatic preparation and packaging of lump sugar.

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Imperial Sugar Company's automatic melt station. ANON. *Sugar J.* (La.), 1959, **22**, (7), 14–15.—Raw sugar from rail cars or from the sugar warehouse is brought by conveyor via a supply bin to an automatic scale which delivers 2 short tons per dump, recording the weight and overweight and transmitting this to the control point. "Electric eyes" stop the conveyor when the sugar reaches a high level in the supply bin and also prevents the dump gate from opening if there is not sufficient sugar to fill the scale. Raw sugar from the scale passes to a mingler to which is added affination syrup at constant temperature, the rate being related to the mingler's motor load and thus to the magma Brix. The magma passes via a mixer to a battery of six automatic centrifugals. Washed sugar is melted to a liquor of controlled Brix and temperature, the melter level also being controlled automatically. The rate of flow of liquor is governed by the level of the surge tank in which the liquor is screened before passing to process at a rate governed by the tank level. The control system is interlocking and provided with graphic and electric panels, alarms, etc.

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Increasing the grinding capacity for the existing Taiwan mills. C. F. TSENG. *Taiwan Sugar*, 1959, **6**, (9), 21–26.—By examination of the sugar recovery during a season, it is shown that the average crop period could be reduced from 150 to 120 days by increasing mill capacity from 56,800 to 66,400 tons/day (17%). The factors governing tandem capacity are listed and an account is given of experiments to examine quantitatively the effect of two, viz. roller grooving and roller speed. Two parallel tandems at Chi-Hu were run, one ("A") with the standard grooving, the other ("B") with a new grooving. After necessary adjustment of settings, tandem "B" showed a capacity 7% higher the "A", and slip was eliminated, but moisture in bagasse rose to 45%. The old-type top and back rolls were replaced in the last mill and moisture returned to 41%; later, on fitting a new back roll to the last mill, moisture climbed to only 42%. In a second trial, the mill engine speeds were increased by 24%; extraction fell by 0·5% but capacity rose by 30%. Bagasse moisture rose by 1½% but returned to normal when the new back and top rollers were replaced by the old-type rollers.

Beet Factory Notes

Effects of some variables on first carbonatation. A. I. MORGAN, A. E. GOODBAN, R. TERANISHI, R. E. KNOWLES and R. E. MCCREADY. *J. Amer. Soc. Sugar Beet Tech.*, 1959, **10**, 396–402.—A model Dorr carbonatation plant has been tested for its suitability as a tool for investigation of the effect of beet composition on processing. A schematic diagram gives details of its composition, while the variations in sedimentation rate, filtration rate, purity, colour, lime salts at 100°Bx and total nitrogen with increasing alkalinity were measured and recorded in graph form. The results were anomalous so far as colour was concerned and the dependability of lime salts from experiment to experiment is low; however, the technique is otherwise satisfactory and reproducible and is suitable for the studies planned.

* * *

Changes in waste-water economy. K. SKALSKI. *Gaz. Cukr.*, 1959, **61**, 339–342.—Problems of flume and waste-water treatment and disposal in Poland are discussed. The use of hydrocyclones would bring the advantages of better recirculation of the flume water and less space requirements compared with settling ponds; but only 75–85% of the waste matter is removed in a hydrocyclone compared with 90–97% after 30 min in a settler, so that a settler would be necessary after the hydrocyclones. Moreover, as the mud density from a hydrocyclone has been stated to be quite high (150–300 g/litre), the waste needs to be diluted with 3–6 volumes of water so that it can flow to the disposal point. Major benefits as regards waste water schemes can be derived from the installation of continuous diffusers. The disposal of waste water also poses a problem, as the demands for fresh water increase and the availability falls. Thus, pollution of fresh water must be guarded against.

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Improving the heat economy in the sugar factories of the Pomeranian region. A. POMARANSKI. *Gaz. Cukr.*, 1959, **61**, 345–347.—Details are given, for 1955–58 inclusive, of the coal consumption in 12 factories in the Pomeranian region of Poland, which in 1956 showed above-average consumption figures. The data show a drop in all cases as a result of replacement of old equipment and extensive repairs, on which nearly 40 million zloty was spent.

* * *

Investigations on the wear of rotary diffusers. I. I. PRILUTSKII. *Sakhar. Prom.*, 1959, (11), 28–32.—Sections were cut from each of the 28 cells of two identical continuous rotary diffusers, cleaned and measured with a micrometer. The sections were taken from the drum wall, the scroll stem and the blades. It was found in the first 3–4 and the last 4–5 cells that the sections were covered with a 0·5–1 mm thick protective black film formed by raw juice and beet pulp decomposition products. From the 4th cell the thickness of the film started to diminish, but not equally throughout the cell. Where there was no film the metal was corroded, being most affected in cells 7–8, and gradually improving away from the middle of the diffuser. Pitting was also found, starting with cells 5–6 and reaching a depth of 2–3 mm. This was found under the radial screens and is attributed to turbulence and trickling of the juice removing the protective film, and to the fact that these surfaces are sometimes immersed in a liquid and sometimes a vapour phase. The corrosion, which affected about 60% of the surface of the middle cells, is mainly caused by the action of organic acids in the juice. A drop in temperature to 40–50°C allows various microbiological processes to take place, as is also the case when pulp enters the juice tank when the diffuser head is overloaded and the screens are blocked. After a time, the accumulated pulp, also found at the radial and tail screens, starts to decompose. Changes in the pH of the juice are also to blame. Graphs with tabulated data clearly demonstrate the extent of corrosion.

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Purifying carbonatation juice with ion exchange resins. G. S. BENIN. *Sakhar. Prom.*, 1959, (11), 36–38.—The claims made by various authorities as to the results achieved with ion exchange treatment juice are refuted, on the grounds that their published data are inadequate and that some of the claims are made by interested parties such as resin manufacturers, etc. It is held that at present there is no resin which will answer the demands of the sugar industry, and that if success had been achieved, for instance, in treatment of 50% of the juice in tests carried out by the Central Sugar Research Institute during some months, a 0·6% increase in sugar yield might have been expected. This was not so. The use of the Na cycle is inexpedient, as the losses of sugar to molasses are not reduced and regeneration of resins on this cycle is costly. Claims of success in the use of resins on the Ca cycle (the SCC scheme) are considered premature and need to be thoroughly investigated.

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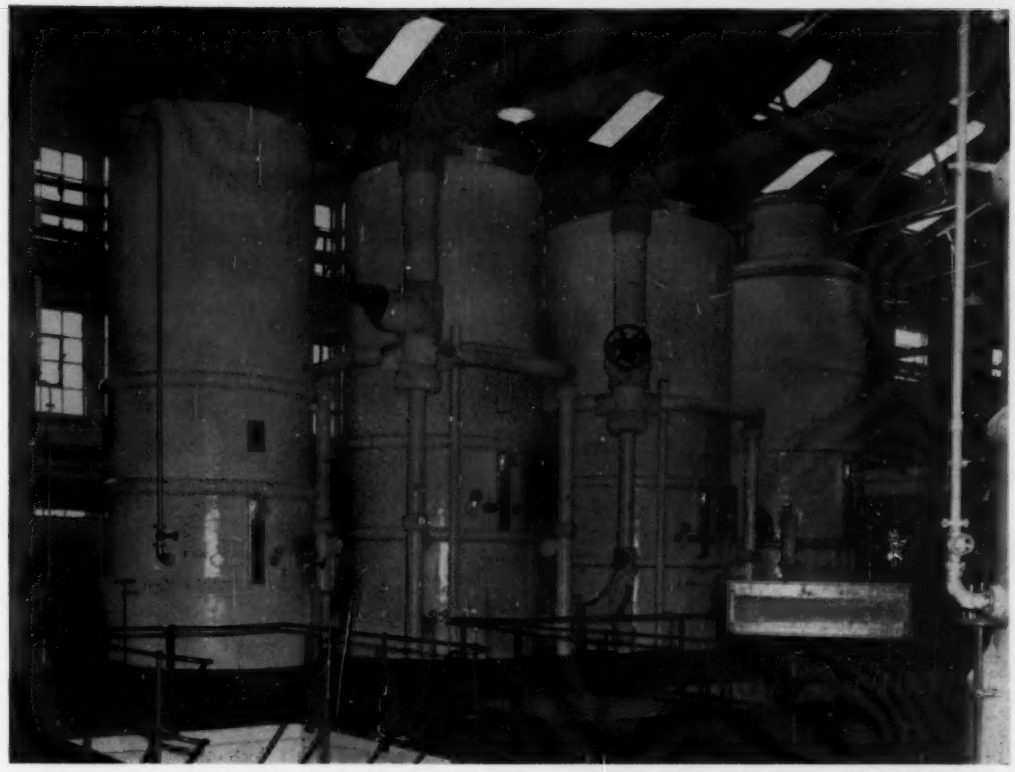
Tests on operation of a lime kiln on natural gas. V. P. MEKHEDA. *Sakhar. Prom.*, 1959, (11), 43–47.—A kiln, converted from anthracite-burning to the burning of natural gas, is described with some diagrams and analytical data. The CO_2 content of the exhaust gases is given as 34% and the limestone is more evenly burnt.



Evaporators at the British Sugar Corporation Beet Sugar Factory at Cupar fitted with H & W 70/30 Brass Tubes. The evaporators are lagged with plastic lagging. (Photograph by courtesy of the British Sugar Corporation Limited).

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Automatic control of the speed of a beet slicer. N. R. FREPON. *Sakhar. Prom.*, 1959, (11), 51–56.—A circuit diagram is given of a scheme for automatic control of the slicing rate of a beet slicer. Voltage is fed to the exciter of the slicer's motor from a D.C. generator, actuated by a 3-phase asynchronous motor drawing current from the factory grid. Thus changes in the voltage cause variations in the slicing rate. The changes in the voltage from the generator are brought about through a shunt regulator actuated by a servomotor, which is automatically actuated by a cossette feed control, e.g. from the band weigher, or from the diffuser control panel. A graph is presented of the daily beet capacity of a factory *vs.* the slicing rate of a STSB-12 beet slicer.

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Experimental study of diffusion. P. DEVILLERS and M. LOILIER. *Ind. Alim. Agric.*, 1959, **76**, 851–866.—The effects of a number of parameters—temperature, cossette size, diffusion time, origin and state of the beet, and the effect of a number of additives—have been studied in laboratory experiments on diffusion. The cossettes were slowly stirred with 150% w/w of distilled water in a Pyrex beaker which was closed with a strip of polyethylene sheet having two holes, one for the stirrer shaft and one for the withdrawal of samples. The assembly was held in a water bath with a heater and a thermostat of $\pm 0{\cdot}5$°C precision. The cossettes and cold water (12°C) were raised in the bath to diffusion temperature and kept at this for 3 hr. They were cooled to 20°C and the juice and cossettes separated. The course of the diffusion was followed by measuring the refractometric Brix of the juice while the final juice was analysed, as was the original juice in the beet (separated after homogenising a sample of cossettes in a "Turmix" high-speed mixer), by determining pol, refractometric Brix, alcohol-insoluble matter, matter precipitated by acidification to pH 4·8–5 (in the cold), and also by passing through a sulphonated polystyrene cation exchanger and a "Deacidite 300" or "Duolite A 40" anion exchanger, thereafter eluting the former with N ammonia to yield a fraction B (betaine, amino acids and weakly basic components) and with HCl to yield fraction D (metal chlorides), and eluting the latter with N HCl to yield fraction C (non-volatile weak acids, particularly organic acids). Defects of the method are discussed from the effect of varying marc and loss of sucrose in diffusion. If the sucrose diffused was considered as a function of that diffused at equilibrium, the concentration with time at constant temperature was found to give a straight line when plotted as a semi-log graph, so that the half-diffusion time was a characteristic constant for the conditions chosen. At the same time non-sugars increased while the pH fell, and the loss of sugar gradually increased. Since the time of half-diffusion varied with the beets, the effect of temperature was studied by measuring this time at the temperatures required and also at 70°C, relating the former time to the latter. It was found that the half-diffusion time (at 70°C = 1) fell from 2·6 at 20°C to about 0·9 at 80°C and 0·71–0·82 at 90°C. A critical temperature of 60–70°C was noted. Of the impurities, only the alcohol-insolubles seen to be greatly affected by diffusion temperature, increasing appreciably below 65°C and rapidly above 65°C. Sugar losses seemed unaffected. When the cossettes (10 mm × 10 mm × 50 mm) were sliced in half longitudinally (5 × 10 × 50 mm) and then in four (5 × 5 × 50 mm) and extracted, the half-diffusion time was reduced to 47% and 27% respectively, on average. Beets stored in the cold were examined and it was found that average half-diffusion times fell from 64 min for August beet to 50 min for December-January beet, although the variation from one lot of beet to another was very wide, e.g. between 44 and 80 min. The drop in average time between August and November was only 6 min or 10%, however, which is not significant industrially. The sugar losses were extremely variable, varying from 0 to 7%, and averaged 2·6% of the original sucrose, with one higher value at 12%. The soluble non-sugars in diffusion juice were greater than in the press juice although the average purity of the former was 89·3 compared with 87·8 for the latter. Diffusion juice purity varied between 78 and 93, a 1:3 variation in total impurities, while the soluble impurities varied from 3·3 to 16%. Diffusion was studied where various additives were present in the diffusion water. Higher concentrations of acid (HCl, SO_2, H_2SO_4, H_3PO_4 and HNO_3) increased the speed of diffusion, but no effect would be obtained at the concentrations used in industry; ammonia increased while lead sub-acetate slowed down diffusion, and chalk had no effect. No noteworthy change in sugar losses occurred except where the acid concentration present was sufficient to cause sucrose hydrolysis. Juice purities were not strongly altered by the additives, except ammonia, which solublised pectins.

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Present attitude to the problem of (beet) juice purification. A. BRIEGHEL-MÜLLER. *Socker Handl.* I, 1958, **14**, (5), 103–105; through *S.I.A.*, 1959, **21**, Abs. 781.—Batch processes and continuous processes of purification are compared. Batch processes give better juice quality and more adsorptive carbonate precipitate. Continuous processes are however preferred from the point of view of automation and labour economy, and the development of such methods is discussed. Special plant, or at least modifications of existing equipment, will be necessary, and further study of chemistry of the processes, of mud and cake structures, and of filtration and/or decantation conditions wil be required. The division of the saturation into two stages, with intermediate separation of muds, is not considered to offer any advantage over continuous saturation.

Remarks concerning the purity of 3rd massecuite. J. KURZEWSKI. *Premysl Spozywczy*, 1958, **12**, 263–265; through *S.I.A.*, 1959, **21**, Abs. 783.—The purities of 383 massecuites from one factory in Poland during the 1954–55 campaign are tabulated, together with the corresponding rendement and purity of molasses figures. It is concluded that the purity of 3rd massecuites should be greater than 80 in order to achieve the maximum crystallization.

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On certain questions of the development of the Polish sugar industry. YA. N. DOBROVOL'SKII. *Sakhar. Prom.*, 1959, (12), 3–9.—A short review of the history and future developments of the Polish industry is given, with a mention of the Polish factories planned and already erected in China, the Soviet Union and Iran. Full details are given of a D.d.S. diffuser at Goslawice factory which processes 1500 tons of beet per day. A diagram is given of the control scheme, by which condenser water and steam fed to the heating chambers and juice draw-off are automatically controlled. The condenser water is treated with saturation gas, reducing the pH from 8·5 to 6·3 and thereby cutting the number of bacteria—of mesophiles to 1% and thermophiles to 3·5% of the original figure. Mean diffusion losses in 1958 were 0·33%, compared with 0·75% in the battery diffuser (3-year average), and undetermined losses were 0·52% compared with 0·63% in the battery. At draughts of 120, 110 and 105%, the corresponding diffusion loss figures are given as 0·15%, 0·30% and 0·40% respectively. A saving in coal of 0·66% on beet has resulted, and the maintenance personnel cut from 12 to 3 men.

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Steps to increase the capacity of sugar factories. YU. D. KOT. *Sakhar. Prom.*, 1959, (12), 10–14.—At No. 2 Kuban factory a 18-cell battery diffuser has been split into two separate halves, working independently, but linked by feed pipes. Each 8-cell battery has its own measuring tank and pulp trap. A daily throughput of 1700–1800 tons of beet (up to 2000–2200 on some occasions) at "normal" losses and a juice draught of 135% were achieved. Losses of sugar to molasses were 0·71% on beet and undetermined losses were 0·45% on beet, dropping to 0·30% over a 15-day inspection period. Cossette length was 30–35, and sometimes 40, m/100 g, and a 0·6–0·8 atm head of water was not exceeded. The high temperature of 75°C, which had no adverse effect on the filtration, etc., of the juice, was achieved by pre-heating the condenser water with 4th effect vapour. This reduced steam requirements in diffusion by 3–4% on beet, only half of the 220% water on beet being discarded with the pulp. An increase in diffusion capacity can be permitted by increasing evaporator capacity, using part of the 1st effect vapour to heat the 3rd effect, some of the 3rd effect vapour being bled to the pans. The 3rd effect vapour volume can be raised by 14%, and, if this is used in the pans and 4th effect, will allow evaporation of 28% more water than under normal conditions. At No. 2 Kuban the evaporator efficiency could be raised by about 30% without exceeding the normal fuel requirements. These results are not possible if the 1st effect juice vapour is drawn off for 1st and 2nd product pans.

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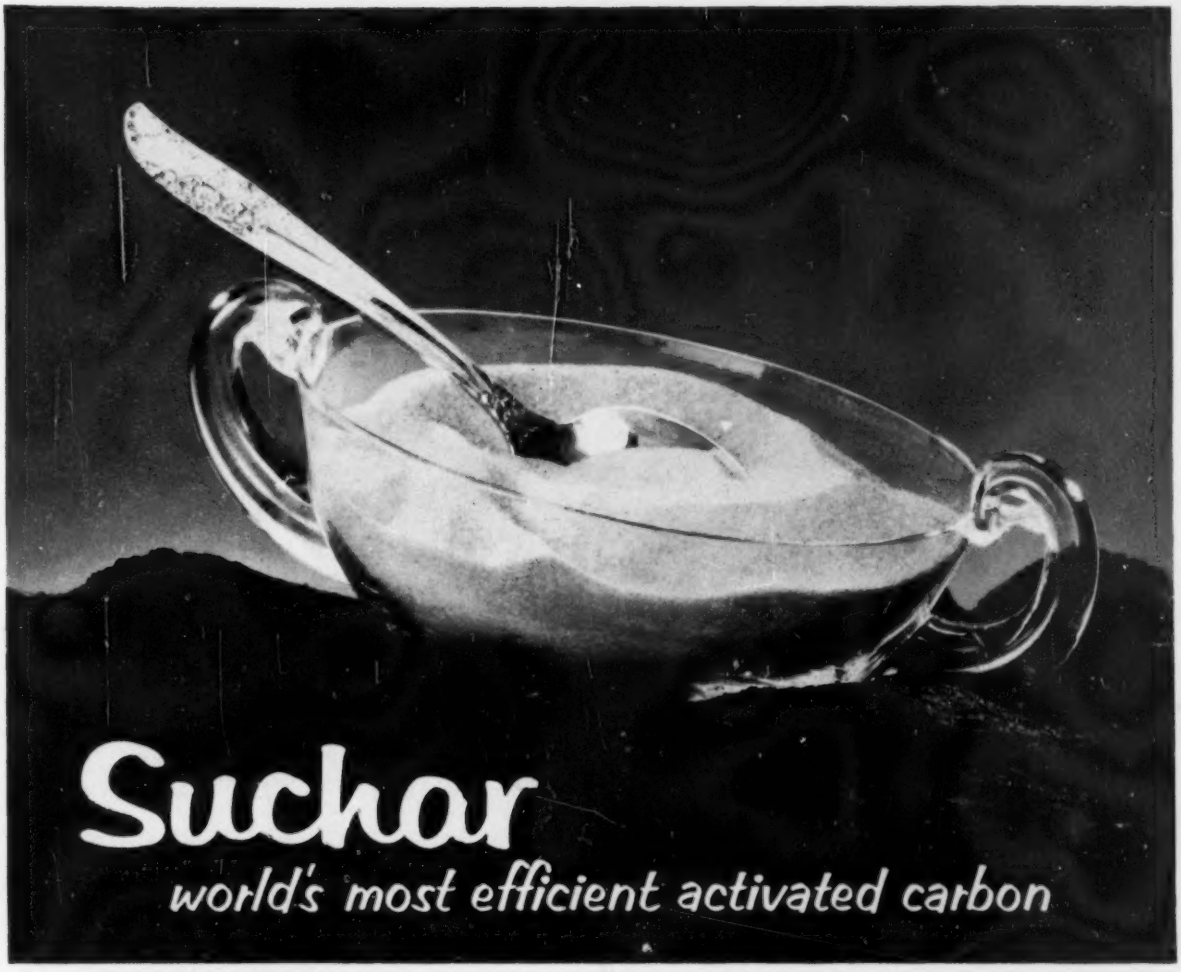
Tests on a continuous diffuser at Zherdevsk factory. S. M. GREBENYUK. *Sakhar. Prom.*, 1959, (12), 14–17.—A 100 tons of beet/day continuous diffuser is described with a diagram. The apparatus comprises two vertical columns, joined by a U-bend, into the shorter of which are fed the cossettes. A piston-type valve is forced down the longer column at the rate of 30–150 strokes/hr into the cossette-juice mixture, which is forced into the piston head through openings, which close on the upward stroke. At a point towards the top of the column the cossettes are discharged onto a screw conveyor feeding them to a chute and the juice drops towards the cossette-juice mixture. Condenser water is fed into the longer column and the juice is finally discharged through a screen in the cossette delivery tube in the shorter column. A scalding chamber is located in the shorter column with a parallel chamber in the longer column. Losses at a juice draught of 128% are 0·70%, and the cossettes are not crushed, despite a length of 9·5 m/100 g. The mean temperature is 48·4°C and retention time is about 60 min. Three such diffusers are being constructed for 50, 100 and 600 tons of beet/day.

* * *

Defects in technological equipment, installed in new sugar factories. S. G. TSIZIN. *Sakhar. Prom.*, 1959, (12), 18–21.—Faulty equipment installed in Soviet sugar factories is attributed to the lack of experience of engineers in some machine shops, which do not specialize in sugar equipment manufacture. Certain types of machinery have become obsolescent and suggested replacements are discussed.

* * *

One source of sugar loss in diffusion. P. D. GOLOVKOV. *Sakhar. Prom.*, 1959, (12), 21–25.—Sugar losses in a battery diffuser can be caused through leaky water or juice valves, the juice or water seeping through and reducing juice density and upsetting juice circulation in the battery. While it is easy to detect faults in a water valve, it is more difficult in the case of juice valves. An example of what may occur is explained with the help of a diagram of a 16-cell diffuser, with 13 cells in operation per cycle. The leaky valve is that between cells 16 and 1. During one complete cycle, juice will be discharged through 13 different valves to the raw juice tank *and* some will also pass through the leaking valve 1. As the cycle proceeds, the juice passing from cell 16 will become more and more dilute, until the completion of the cycle, when this cell is the tail cell, and water passes into the juice main feed. The head cell will then be No. 12, and the density of the juice sample taken during draw-off from cell 12 to the raw juice tank will be the minimum of the cycle. After this, with cell 1 as tail and 13 as



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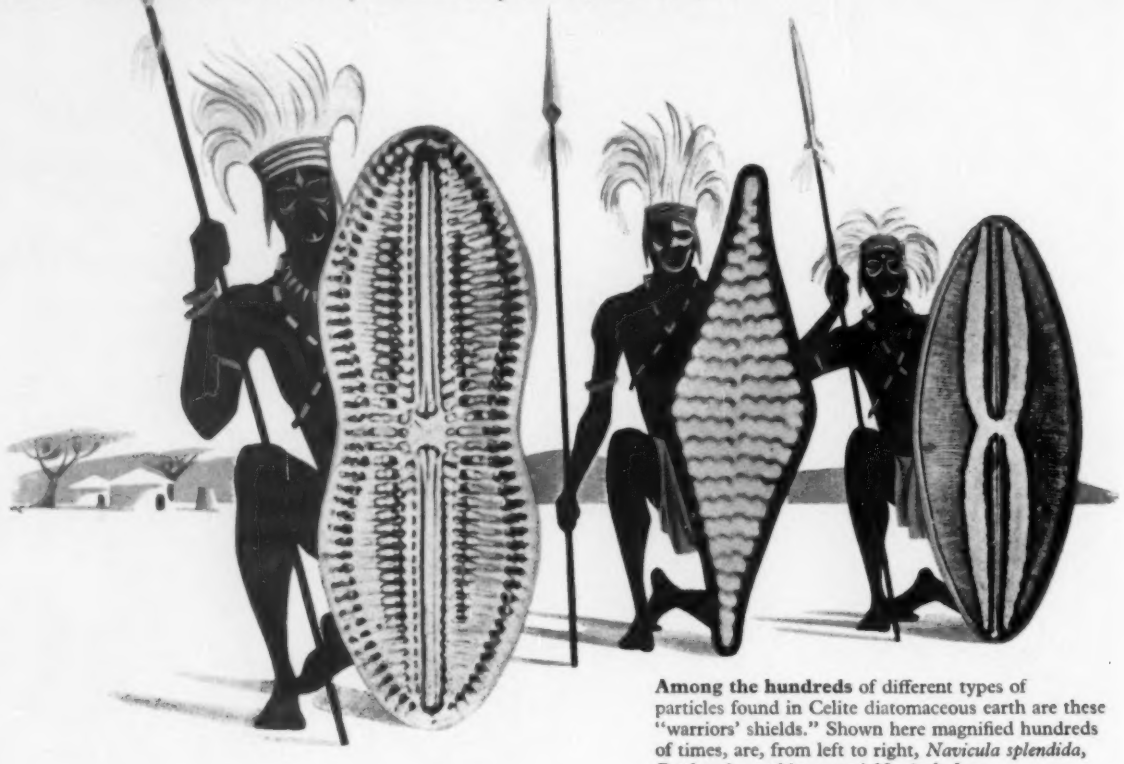

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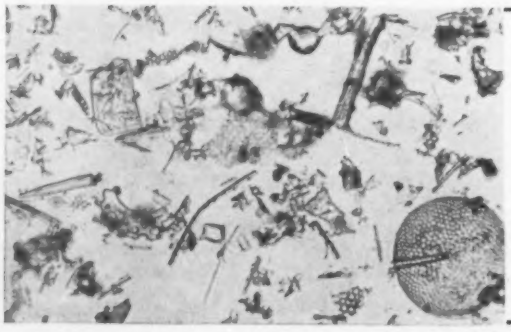

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head, the density will start to rise. However, some juice from the main feed will pass through the damaged valve into the juice heater and thence through the open valve of cell 16. Juice samples must be taken during one or two complete cycles, both from the diffuser cells (through the air valve) and especially from the juice tanks. A graph is presented, showing the effect of a damaged valve on the juice density throughout a cycle, and tabulated data show the drop in Brix incurred in each cell during one or two complete cycles. On an average this is 2% on beet, the juice density from cell 12 being 8°Bx when pumped to the tank, compared with 14°Bx when the valves do not leak.

* * *

Cleaning raw juice heaters by a phosphate method. A. A. GVOZDIK. *Sakhar. Prom.*, 1959, (12), 25–26.—At Gorodishchensk factory the three raw juice heaters are cleaned out at 70°C during 3 hr with a trisodium phosphate solution pumped from one side of a partitioned tank, the spent phosphate solution being returned to the other side and thence discarded. A trolley-mounted tank can be moved on rails into a position beneath each heater. This has a pipe passing through the floor and connected by feed line to the drain side of the phosphate tank. It is used to catch any phosphate drainings and can also be used to trap any raw juice drainings. The trisodium phosphate solution is made up in the tank by dissolving 50 kg trisodium phosphate per heater in 1·5 cu.m. ammoniacal water. The average daily requirements per heater are 12·5 kg trisodium phosphate. Over a period of 210 days no supplementary cleaning by hand was needed and there was no reduction in heat transfer. Only a small amount of deposit was found on some tube wall sections.

* * *

Continuous extraction by rotary diffusion—a step forward in the production process of the sugar industry. H. J. FISCHER. *Zuckererzeugung*, 1959, **3**, 319–322.—The performance of a Sangerhausen continuous rotary duffuser[1] during the 1958/59 campaign at Rossleben sugar factory proved satisfactory. Average losses were 0·28% at 112·5% juice draught. Graphs are presented of temperature, Brix and pH throughout the 24 cells of the diffuser. Retention time is about 55–68 min, depending on the temperature, the optimal of which is from 74°C at feed to a constant of 67°C until discharge. A chlorinated rubber paint has been used to prevent corrosion recurring. The diffuser operates on 100% water return and has a fresh water requirement of 50–80% on beet. Raw juice purity is comparable to that from other diffusers, and the diffuser is simple and robust. Disadvantages include large floor-space requirements; only 20–30% charging, leaving the unused 70–80% exposed to corrosive atmospheric oxygen; and high power requirements. A number of relatively slight alterations are to be made.

The utilization of heat from hot condensate. V. SÁZAVSKÝ. *Listy Cukr.*, 1959, **75**, 265–269.—Condensate removal and steam separation from the condensate are discussed, and the Niessner and TSINS-type barometric condensers are compared[2]. The former is found to have disadvantages of being too tall and too heavy. The amount of condensate removed by means of a diaphragm control is limited, but a diphragm used in conjunction with a short barometric leg will give the advantages of low height and weight, plenty of scope for automatic control and complete condensate expansion.

* * *

The use of hydrocyclones for milk-of-lime purification. S. BOUČEK and V. VALTER. *Listy Cukr.*, 1959, **75**, 272–275.—Tests carried out on milk-of-lime purification in a hydrocyclone are discussed. The length of the cylindrical section was 100 or 350 mm, feed pressure was 1·1 atm and the discharge nozzle dia. was 10 or 12 mm. Purification efficiency was almost 100%. The amount of waste lime was found to increase to 8% as a result of increased removal of particles of unslaked lime, when slaking was inefficient. The ratio of waste lime to sand was improved by lengthening the cylindrical section to 3·5 times the hydrocyclone dia. (i.e. 350 mm) and using a 10 mm discharge nozzle. With this combination, the amount of sand in purified lime was 0·04%, in the sediment 120–160 g/litre, with 700 and 570 g CaO/litre in the mud (or 580 and 350g/100g sand, respectively). The hydrocyclone capacity, Q, is given by $Q = 0{\cdot}60\ F_o \sqrt{2gH}$ cu.m./sec or $Q = 15\ D^2 p$ cu.m./min where F_o = cross-section area of the feed nozzle in sq.m., $g = 981$ cm/sec/sec (acceleration due to gravity), H = pressure in m water column, D = dia. of the cylinder in m, and p = feed pressure in atm.

* * *

"Steelon" fabric in filter presses. S. WOLLOSIECKI. *Gaz. Cukr.*, 1959, **61**, 365–368.—The extent of shrinkage of "Steelon" filter cloths, which are becoming widely used in Polish sugar factories, is discussed and methods of cutting and folding the cloths are described. Factory data are also given of wear and tear of the cloths, and two recommendations are made: (1) to use the cloths without a hem, to prevent ruffling, and (2) to boil the cloths at 100°C for 15 min and dry each cloth separately to prevent acute shrinkage.

* * *

The use of kieselguhr for filtration. S. GAWRYCH. *Gaz. Cukr.*, 1959, **61**, 368–370.—Filtration of juice and clairce with the addition of kieselguhr was tested, using two types of natural silicious earth from Poland and "Hyflo-Supercel." Conductimetric ash, CaO content and colour are tabulated and favourable results were obtained. The natural earths were as good as the "Hyflo-Supercel," although results from clairce treatment were inconclusive. Further tests are required to determine doses and applications.

[1] *See Zuckererzeugung*, 1958, **2**, 89–92.
[2] *See also* KUTSENKO: *I.S.J.*, 1958, **60**, 367; VAISMAN: *I.S.J.*, 1959, **61**, 178.

NEW BOOKS AND BULLETINS

The South African Sugar Year Book, 1958–59 edition. 256 pp; 8½ × 10½ in. (The South African Sugar Journal, 321 Smith Street, Durban, Natal, South Africa.) 1959. Price: 10s. 0d.

The latest of these comprehensive year books describing the South African sugar scene follows the pattern set by its predecessors and is no less valuable a source book to all concerned with the sugar industry of that country. In addition to the reference and statistical sections concerning the sugar industry organizations and committees and the crop data for 1959 and previous years, considerable information is provided on the sugar companies of South Africa, staffs, their properties and equipment, etc., as well as details of personnel, equipment, etc., of sugar milling enterprises in countries neighbouring South Africa. But much of the book is occupied by five special articles on topics concerning the industry—recent developments in cane growing, overhead irrigation, flood damage in Natal, progress in Swaziland, and the Umfolozi refinery—and also the industrial reviews and articles, which include the reports of the S.A. Sugar Cane Growers' Associations and of the Sugar Milling Research Institute, an account of the opening of the Annual Technologists' conference, and many other items. Once again the book is plentifully illustrated with black and white photographs and a number of colour photographs.

* * *

Advances in Carbohydrate Chemistry. M. L. WOLFROM and R. S. TIPSON. 526 pp; 5¾ × 9 in. (Academic Press Inc., New York 10, N.Y., U.S.A.; Academic Books Ltd., London.) 1959. Price: $15.00; 120s. 0d.

While larger (and more expensive) than the previous volume of the "Advances", only seven subjects are dealt with compared with ten. Three of these are topics in which there has been exceptional recent progress—the amino sugars, the hemicelluloses, and the inositols while other discussions include those on the oxidising action of lead tetra-acetate on sugars, the pyrimidine nucleosides, β-glucuronidase, and the Maillard browning reaction between sugars and amino acids. The bibliographies are extremely thorough—there are 304 references to the literature, for example, in the section on the Maillard reaction, including at least one as recent as 1959. An obituary of the late GÉZA ZEMPLÉN is included.

* * *

Gospodarka Cieplna w Przemyśle Cukrowniczym. (Heat Economy in the Sugar Industry.) S. GÓRSKI and Z. KOKELI. (In Polish.) 190 pp; 5¾ × 8¼ in. (Gazeta Cukrownicza, Warszawa, ul. Czackiego 3/5, Poland.) 1959. Price: 32 zloty.

Number 3 in the Library series of useful pocket editions is divided under 12 main headings. These cover coal economy, with tabulated data on the properties of various types of coal; steam and energy production generally; steam consumption in the sugar factory, each process being dealt with individually; evaporators and evaporation; feed water treatment; thermo-compression; continuous heat control, with description of the various instruments used, such as thermometers and manometers; the heat balance of a sugar factory; and automatic control of heat processes. There are numerous data, sample calculations and diagrams, and the volume should prove most valuable. It is to be regretted that many sugar technologists will not be able to benefit from it because of the language difficulty.

* * *

Stowarzyszenie Techników Cukrownikow. (The Association of Sugar Technologists.) Z. KOWALEWSKI. (In Polish.) 137 pp; 6½ × 9½ in. (Wydawnictwo Czasopism Technicznych NOT, Warszawa, Poland.) 1959. Price: 30 zloty.

This book has been published to mark the 40th anniversary of the founding of the Circle of Sugar Technologists and the 75th anniversary of the founding of the Sugar Group of the Warsaw Section of the Society for Promotion of Industry and Trade, which was the first Polish sugar association. It is a history of the Polish sugar industry and of the Association covering the period from the first days, with the founding of the first beet factory in the world by F. K. ACHARD in Silesia in 1802, to very recent times, with a brief mention of future plans. A list of members and officers of the association is given.

* * *

Soils of the Sugar Belt. Part 2. B. E. BEATER. 77 pp; 5½ × 8½ in. (Oxford University Press, Warwick Square, London, E.C.4.) 1959. Price: 35s. 0d.

The area covered by this survey, which forms the second part of the series of which the first part has already been noted[1], is the Natal South Coast, extending from Durban southwards to latitude 31° 01′, the most southerly point in the world at which cane is grown commercially. Here temperature, as well as rainfall, tends to become a limiting factor and the first section briefly reviews these two factors in addition to topography, drainage and the geological features, of which an interesting comparison is drawn with those of the North Coast (Part 1). The second section details the soil groups and sub-groups as related to the rocks from which they are derived. It includes a brief note on the relative fertility of these groups. The third section, by R. R. MAUD, adds notes on the mineralogy of the rocks and corresponding soils. The whole constitutes a painstaking study and worthy successor to Part 1.

[1] *I.S.J.*, 158, **60**, 110.

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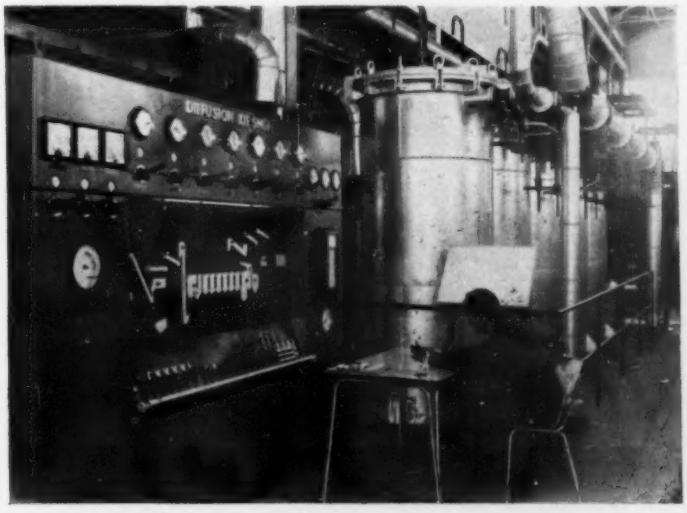

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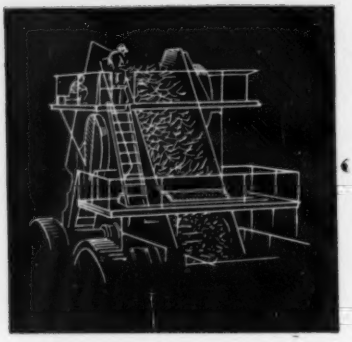

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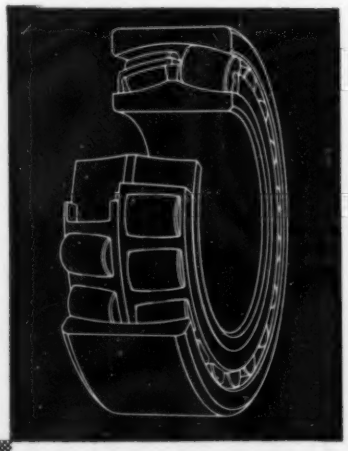

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LABORATORY METHODS AND CHEMICAL REPORTS

Composition of "floc" formed in acidified syrups from refined granulated cane sugars. M. F. STANSBURY and C. L. HOFFPAUIR. *J. Agric. Food Chem.*, 1959, **7**, 353–358; through *J. Sci. Food Agric. Abs.*, 1959, **10**, ii–227.—Starch, lipids (wax), protein, ash constituents and decolorizing carbon from refining are the major components of the material (floc) which occasionally gradually precipitates from acidified syrups prepared from refined granulated cane sugars. The carbon and organic matter predominate; silicon is the main inorganic constituent. Possible test procedures for estimating floc in refined sugars have been examined, and a suitable modification of one of these appears promising.

* * *

Colouring matter in molasses as oxidizing-reducing systems. A. M. MALKOV. *Izvest. Vysshikh Ucheb. Zavedenii, Pishchevaya Tekhnol.*, 1959, (2), 45–50.—Molasses solutions, acidified with H_2SO_4 and decolorized with zinc dust, darken on standing in air. Fenton's reagent (ferrous sulphate plus hydrogen peroxide) and hydrogen peroxide were added to a decolorized molasses solution, in a study of this phenomenon. It was found that some of the colouring bodies are reduced initially, but the leuco-compounds undergo autoxidation in air. The effect of the H_2O_2 reagent increased with the iron content. Those colour bodies which were not reduced retarded the oxidizing effect of the reagent, while potassium cyanide also retarded oxidation in the presence of both leuco- and non-reduced colouring bodies.

* * *

A conductimetric method of determining the volume of crystals in a massecuite. V. D. POPOV and I. G. BAZHAL. *Izvest. Vysshikh Ucheb. Zavedenii, Pishchevaya Tekhnol.*, 1959, (2), 136–141.—Laboratory tests were carried out with a water-jacketed polarimeter tube to determine the relative conductivity of an artificial "massecuite" containing quartz crystals. The tube had stainless steel ends as electrodes and was connected to a measuring bridge. The relative conductivity was found to be independent of crystal size, "massecuite" temperature, intercrystalline molasses purity, and supersaturation coefficient; it was found to be a function of the volume of crystals and of their displacement relative to the direction of current flow. Factory tests showed a first order relation between the relative conductivity and the volume of uniformly displaced crystals, as is the case in pan boiling.

* * *

The composition of the alkali-stable polysaccharide of sugar beet pectin. P. ANDREWS, L. HOUGH, D. B. POWELL and B. M. WOODS. *J. Chem. Soc.*, 1959, 774–779; through *S.I.A.*, 1959, **21**, Abs.688.—Sugar beet chips were treated with hot lime water to give a 5% yield of the alkali-stable polysaccharide, which was unaffected by further heating in saturated lime water for 24 hr at 80°C. The polysaccharide was examined by hydrolysis followed by paper chromatography, by electrophoresis, by acetylation, and by partial hydrolysis, and was found to contain L-arabinose, D-galactose, L-rhamnose and galacturonic acid in the approximate proportions of 74, 10, 3·5 and 5%, respectively. Smaller quantities of 2-*O*-methyl-D-xylose, 2-*O*-methyl-L-fucose, mannose, fucose and an aldobioluronic acid composed of galacturonic acid and 2-*O*-methyl-xylose were also found. The polysaccharide preparation had an approximate molecular weight of 12,500, and it could not be fractionated. It is suggested that the "araban" component of pectin exists in combination with a variety of monosaccharides.

* * *

The effect of invert sugar on the quality of purified juice. F. N. DOBRONRAVOV, A. M. GERASIMOVA and G. V. ACHKASOVA. *Sakhar. Prom.*, 1959, (10), 19–23.—The effect of invert sugar on the filtration and sedimentation rates of juice was studied in laboratory tests, in which 0·15%, 0·40%, 0·65%, 1·25% and 1·75% (on weight of sugar colution) of (1) glucose in solution and (2) invert in solution were added to a 12·5% pure sucrose solution and to diffusion juice, both heated to 90°C. The solutions were then pre-limed to pH 11 during 3 min and limed during 8 min with a total of 2·5% lime on weight of solution. The juice was then gassed to 1st carbonatation alkalinity. Graphs are presented of the results. The filtration rate after 0·15% glucose remained constant at about 3·2 ml/sq.cm./min, whereas it increased to about 2·9 with 0·40% invert sugar, then fell sharply. Both invert and glucose caused a sharp drop in the settling rate, the former causing the greater drop. In one variation of the invert sugar test on diffusion juice, the latter was purified with the return of 100% laboratory 1st carbonatation juice. The glucose had no effect on filtration or settling, whereas 0·75% invert sugar caused a drop in both rates. After all tests, the samples were further processed to 2nd carbonatation and the lime salts contents, colour and purity determined. The lime salts content of the 2nd carbonatation juice and pure sucrose solution rose with increase in the amount of invert sugar and was slightly greater in the sucrose solution at the same invert content. With every 0·5% addition of invert the lime salts content of the juices increased by 0·60% on juice dry solids. The colour also rose with the invert content, while the purity of the diffusion juice fell by 3·2 units per 0·5% invert. There was no difference in the effects on the juice with and without return of carbonatation juice.

* * *

Lime salts and their control by rapid determination of the effective alkalinity. W. KRÜGER. *Zucker*, 1959, **12**, 560–565.—See *I.S.J.*, 1959, **61**, 376.

Odour in granulated beet sugar. R. F. OLSON. *J. Amer. Soc. Sugar Beet Tech.*, 1959, **10**, 435–438.—The odour in beet sugars was evaluated organoleptically by a panel of five people. The sugars were passed through a "Dowex 50" cation exchange column and this rinsed free of sucrose and eluted with 5% HCl. Chromatographic analysis of this eluate showed the presence of methylamine and betaine, the odour rating of the sugars being roughly related to the amounts of these compounds.

* * *

Light scattering by commercial sugar solutions. C. J. RIEGER and F. G. CARPENTER. *J. Research Nat. Bur. Standards*, 1959, **63A**, 205–211.—Using a direct measure of scattered light, it was found that commercial sugar solutions (raw, washed and granulated) scatter light predominantly in a forward direction, the scattering at angles less than 30° being as much as 100 times that at right angles to the incident beam. It was found that light scattering by commercial sugar solutions is inversely dependent on wavelength to a power of between 2 and 3, and that severe multiple scattering occurs when the turbidity of the solution, defined as the amount of light scattered per unit path length, is larger than 0·2 cm^{-1} at 436 mμ. The scattering of commercial sugar solutions is compared with that of highly purified sucrose, and the magnitude of the difference shown in graph form on both Cartesian and polar coordinates. The effect of refractive index is considered using solutions of constant RI but varying turbidity, and vice-versa, as well as for variation in both factors. The effects indicate that light scattering (due to difference in RI between the solution and particles present) increases in turbidity but decreases as the RI of the medium approaches the "average" RI of the particles (1·49). A method is discussed which will enable a good approximation of the turbidity to be made from a single forward scattering measurement at an angle of 20° with respect to the incidental light beam. A correction for scattered light in transmission measurements of these solutions is also introduced.

* * *

Tests on new analytical methods in the sugar industry. V. PREY. *Zucker*, 1959, **12**, 585–591.—A discussion, with numerous illustrations, of chromatographic and electrophoretic techniques for determining raffinose, betaine, amino acids, lactic acid and invert sugar. (See *I.S.J.*, 1959, **61**, 344, 377, 378; 1960, **62**, 52, 106, 107.)

* * *

Limits of accuracy of polarization of raw sugar analyses. F. TESCHNER. *Zuckererzeugung*, 1959, **3**, 72–73; through *S.I.A.*, 1959, **21**, Abs. 808.—The use of a stoichiometric mixture of zinc sulphate and potassium ferrocyanide as a clarifying precipitant, instead of lead acetate, has been tested for measurement of the polarization of refined and raw sugars. Markedly improved accuracy and reproducibility of results have been obtained.

Hydrolysis of oligosaccharides in relation to their reductometric determination. K. TÄUFEL and H. RUTTLOFF. *Ernährungsforschung*, 1959, **4**, 44–52; through *S.I.A.*, 1959, **21**, Abs. 816.—The hydrolysis of sucrose, maltose, lactose and raffinose by different concentrations of HCl or citric acid for different times at 100°C has been studied by paper chromatography of the solutions after neutralization with NaOH. Tests of sugars chromatography in the presence of NaCl showed that at about 10% NaCl concentration the resolution of the spots was seriously affected; with Na citrate, concentrations up to 50% did not disturb the chromatograms; the possible effects of the salts were however borne in mind in this work. The results are illustrated and discussed. Some transglycosidation occurs in the acid system, especially at higher temperature, and this might be a source of error in sugar analyses. Sucrose can be hydrolysed completely by 10% citric acid in 20–30 minutes, but lactose and maltose are not affected within that time; differential analysis may thus be possible.

* * *

Organic acids in beets and juices. I. Volatile acids. H. D. WALLENSTEIN. *Zeitsch. Zuckerind.*, 1959, **84**, 612–614.—Investigations of the organic acids content of press juice, raw juice, thin and thick juices, conducted over several campaigns, are discussed with 20 references to the literature. Small amounts of volatile acids were found in the press juice, deteriorated beet having a higher content, and press juice made alkaline with NaOH an especially high content, probably due to separation of acetic and formic acid from the pectins. A 5·5° Bx maceration juice from stored beet showed an average increase from its original 2·3 to 2·5 meq/kg beet. The volatile acids content of the raw juice was higher in continuous diffusers than in batteries, probably owing to the higher temperatures in the former. Especially high contents were found after stoppages, processing of poor beet, and long retention of juice in the evaporators. Butyric acid could only be detected qualitatively, as most of the volatile acids consisted of acetic and formic acid. In alkaline media the formation of volatile acids is due to sucrose decomposition, and should be avoided because of their melassegenic properties as well as the sugar losses entailed. Tabulated data are presented for various juices and return water.

* * *

Rapid method for the determination of the quality of returned 1st carbonatation juice. E. VALKOVSZKY. *Cukoripar*, 1959, **12**, 253–254; through *S.I.A.*, 1959, **21**, Abs. 938.—Fifty ml portions of the carbonatated juice and of the mixture with pre-limed juice are analyzed for carbonate by measuring the CO_2 formed on reaction with HCl in a Scheibler calcimeter. The determinations must be made at the same time; any effects of temperature and pressure can be neglected.

BY-PRODUCTS

A new process for simultaneously obtaining sugar, alcohol and paper pulp from sugar cane fibre. E. A. VÁZQUEZ. *Bol. Ofic. A.T.A.C.*, 1959, **18**, 617–622, 699–702, 777–788.—The drawbacks to conventional paper pulp production in Cuba are (1) the high cost of reagents, (2) difficulty of obtaining sufficient water and (3) disposal of effluents. A new proposal which avoids these is described at length. In the new process bagasse is separated into fibre and bagacillo; the former is degested with caustic potash and converted into pulp (a 40–50% yield of unbleached pulp, of 10–15% moisture content is recommended). The black liquor from the digestion is mixed with vinasse produced from distillation of alcohol after fermentation of the molasses. This liquor-vinasse mixture is concentrated in a multiple-effect evaporator and the concentrate mixed with cane trash before feeding into a furnace where its organic matter content burns and the potassium content is converted to the carbonate. This is leached out and causticised with CaO, giving a solution of caustic potash for further fibre digestion and a $CaCO_3$ precipitate. This latter is separated, mixed with the bagacillo and burnt in a furnace to regenerate the CaO for re-use. The bagasse contains much more potash than is necessary to make up any losses in the recycling process and, since the waste waters contain only K (a fertilizer) instead of Na, they can be returned to the soil in irrigation. The only requirements for the process are a higher labour force and a moderate investment in plant and equipment.

* * *

Dry pulp pressing. G. FRANK. *Zucker*, 1960, **13**, 47–49.—The advantages of briquetting dried pulp for animal fodder are discussed and briquetting plant is described. The advantages include: the possibility of storing the pulp with a 14% moisture content, so reducing fuel requirements for drying. (Storage space is best utilized if the bulk density of the pulp is 0·55–0·65.) Transportation, packing and storage requirements are simple, with a saving in sacking. Fines, dust, etc. can be pressed in with the pulp. Dried pulp, "Troblako," and dried green fodder can be pressed by the same equipment and no molasses is needed for binding. The advantages to farmers are also enumerated.

* * *

By-products research in Hawaii. ANON. *Rpt. H.S.P.A. Expt. Sta. Comm.*, 1959, 53.—About 4–5% of the cane crude wax, containing about 80–85% hard wax, has been extracted on air-dried scums from the hydroseparator at Ewa, irrespective of time of week or day. The dried scum is easily stored, whereas odour rises from wet scum after one week's storage, due to sugar fermentation. The m.p.'s, acid number and infra-red spectrophotometric curves of the freshly extracted waxes were compared with those of extracted stored samples. No difference was detected in odour, melting points (57°–66°C), acid number (31–35) or infra-red curves. Bagasse pith has been examined as a possible carrier for liquid pre-emergence herbicides. It is of low bulk density, so that large volumes are required and drifting may occur, although this should be less than with water and oil sprays or powder suspensions. The pith will absorb 3–5 times its weight of a 2,4-D or 2,4,5-T amine liquid concentrate or of 2,4-D and 2,4,5-T esters. The particles could be spread by dry-dusting tractor, by hand or from aircraft. Tests are to be conducted on large-size bagasse particle boards using commercial toluene diisocyanate as binding agent. Converting sucrose to levulinic acid by refluxing with 15% HCl gave 60% of the theoretical yield, while pressure digestion with H_2SO_4 has been stated to yield 70% of the theoretical. Extraction of the reaction mixture with ethyl acetate, ether and methyl *iso*butyl ketone did not give satisfactory recovery of the levulinic acid.

* * *

Analysis of plant waxes by means of column chromatography and X-ray diffraction. N. WEIDENHOF. *J. Amer. Oil Chem. Soc.*, 1959, **36**, 297–300; through *S.I.A.*, 1959, **21**, Abs. 962.—Waxes from candelilla, carnauba palm, sugar cane and kapok were examined. Waxes from sugar canes (*Saccharum officinarum*) were chromatographed on Al_2O_3 columns and the fractions were eluted by heptane alone, or with other solvents. X-ray diffraction diagrams of the heptane + propanol fractions showed that in waxes on canes cultivated in Java in 1913 and preserved in formalin, and in one wax from a cane grown in a hothouse in Delft, the alcohols were mainly C_{28} and C_{30} alcohols; in the other Java wax, and other Delft waxes, the alcohols were apparently mainly C_{26} and C_{28}. The ratios of the alcohols varied greatly, and this may indicate the presence of a third alcohol. Elution of a Delft, wax with heptane and ether gave a compound which, from the X-ray diagram, was presumably an ester of 58 C chain. The ultra-violet absorption spectrum of one Delft wax showed peaks indicating perhaps a conjugated triene and a 1,2-unsaturated ketone. A wax from wild cane (*Saccharum spontaneum*) cultured at Delft contained mainly C_{24} and C_{26} alcohols, and its u.v. spectrum showed no peaks. Results for sugar cane wax, and for the other waxes, are compared with data from the literature.

* * *

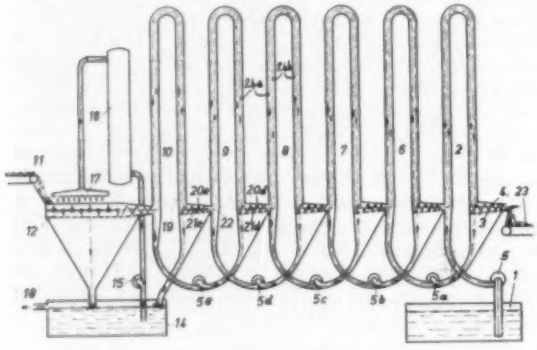
The importance of sugar in the rations of ruminants. S. HOFLUND and O. SVANBERG. *Socker Handl.* II, 1959, **7**, 41–49.—The importance of the sugar content of various natural fodders, especially hay, to ruminants is discussed and the effects of an excess or deficit of sugar mentioned. Supplementing the feed with molasses or beet products, e.g. "Betfor" is often necessary, and molasses is beneficial in silage production, although its use presents difficulties. Fluctuations in the consumption and requirements of molasses and molasses products from year to year are considered and their value discussed.

UNITED KINGDOM

Glutamic acid (from beet wastes). AJINOMOTO CO. INC., of Tokyo, Japan. **830,698.** 21st March 1957; 16th March 1960.—Beet wastes, e.g. Steffen's filtrate or vinasse, are acidified to pH 3 with mineral acid and extracted in a counter-current multistage process with a monohydric aliphatic alcohol (4–5 carbon atoms per molecule) at least 50% (100%) saturated with water. The extract is separated and in turn extracted with water containing an alkali metal or alkaline earth oxide or hydroxide. This aqueous solution is treated so as to hydrolyse precursors to glutamic acid and this either crystallized at pH 3·2 or purified by re-extracting with the alcohol before crystallizing the glutamic acid.

* * *

Extraction of materials from solid bodies (Beet diffusion). C. GLINKA, of Krefeld-Uerdingen, Germany. **830,948.** 5th March 1957; 23rd March 1960.—The diffuser comprises a series of linked loops 2, 6, 7, 8, 9, 10 in which juice and beet cossettes are mixed in a series of stages through which they travel co-current, thereafter being separated and sent on in counter current to each other. Water from reservoir 1 is directed by pump 5 into the left side of loop 2

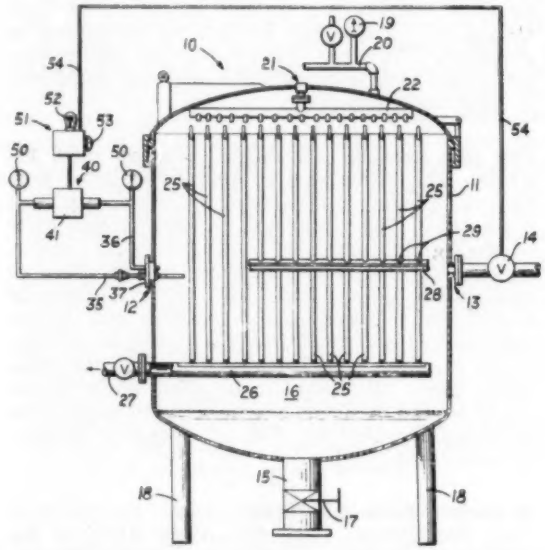


where it is mixed with cossettes delivered by the screw from the right side of loop 6. After mixing in loop 2 the cossettes are trapped by the perforated screen 3 and carried by screw 4 out of the diffuser and onto conveyor 23. The liquid passing through the screen 3, however, is pumped by pump 5a to the left side of loop 6 and, passing round each loop in turn is discharged into tank 14, which it leaves by pipe 18. Some juice is pumped by pump 15 to the heater 16 and thence to the distributor 17 where it heats incoming cossettes on conveyor 12 before returning to tank 14. The heated cossettes leave the conveyor 12 and are directed by the screw into the left side of loop 10, are trapped by screen 21e and directed by screw 20e to loop 9. Each of the screws is conical so as to exert a squeezing action on the cossettes and so remove part of the juice contained before passing to the next stage.

* * *

UNITED STATES

Filter press. D. A. STOLTENBERG, assr. THE DURIRON CO. INC., of Dayton, Ohio, U.S.A. **2,912,110.** 29th May 1957; 10th November 1959.—In the pressure leaf filter 10 having the usual feed inlet 13, leaves 25, sluicing apparatus 21 and drain pipe 15, two probes 37 and 36, at approximately the same level are fitted so that they transmit the pressure



inside the tank to either side of the differential pressure switch 40. While the cake is building up on the leaf the pressures transmitted are equal but when the cake thickness nears its maximum the end of probe 37 is screened from the liquid pressure by the cake and consequently the pressure transmitted is lower. When the maximum permissible thickness is

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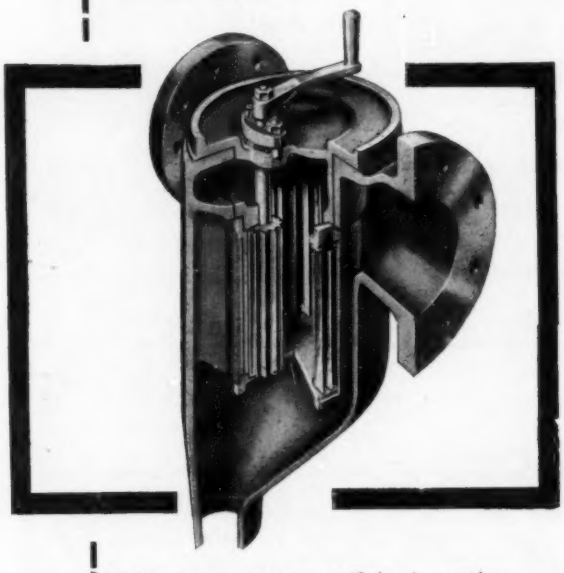

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★ No. 12 ATTRITOR by *Alfred Herbert*, driven by 50 h.p. 380/420/3/50 cycles motor, mounted on combined bedplate with starter and circuit breaker. Motor driven Rotary Feed Table and Belt Magnetic Separator. Welded mild steel Cyclone with rotary airlock, 8½ in. sq. inlet and top of cyclone.

★ ALMOST NEW EDGE RUNNER MILL by *Smith Blythe*, 7 ft. dia. cast iron pan 15 in. deep, single roller 3 ft. 6 in. dia. × 11½ in. wide. Directly driven by 12½ h.p. 400/3/50 cycles motor, positive gear drive, gears machined and running in oil, screw operated sliding discharge door. *Ellison* starting gear.

★ CENTRIFUGAL SWARF EXTRACTOR by *Broadbent*, 36 in. dia., lift-out mild steel basket with ⅛ in. perforations at 1½ in. pitch, and lifting lugs. Three-point suspension, non-pit type, spring balanced lid with safety interlock and hand brake. Underdriven by 12/13 h.p. 400/3/50 cycles motor with starter. Maximum load 450 lbs., 750 r.p.m. SIX AVAILABLE.

★ UNUSED COLD STORE PLANT by *Wm. Douglas*, 100 tons capacity, comprising two 4½ in. × 4½ in. Ammonia Compressors, each driven by *Lister* Diesel Engine, one Horizontal Shell & Tube Condenser, one Liquid Receiver, Air cooler coils, double door, two single left-hand hung doors, three single right-hand hung doors.

★ FLEXTOOTH CRUSHER by *British Jeffrey Diamond*, 20 in. × 16 in., spring loaded adjustable breaker plate and renewable liners and hammer tips. Driven by 10 h.p. 400/3/50 cycles motor with starter.

★ VACUUM OVEN by *Francis Shaw*, 5 ft. wide × 7 ft. high × 8 ft. 9 in. deep internally. Hinged door each end secured by four handwheels. 17 mild steel platens at 3½ in. daylight, 6 in. vacuum, 3 in. steam and 2 in. condensate connections. EIGHT AVAILABLE.

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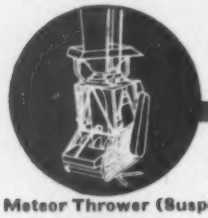
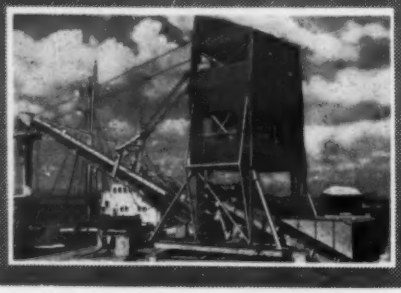


Meteor Thrower (Suspended)

Bagging Unit



A Crone & Taylor Bulk Cargo Loader & Thrower

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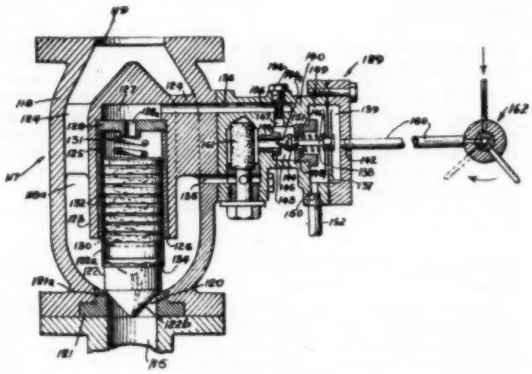
reached the differential pressure is such that the switch 40 comes into operation and by means of the control equipment 51 causes the feed valve 14 to close and the draining, backwashing, etc. sequence to commence.

* * *

Cane harvester feed mechanism. E. M. VAN BUSKIRK, assr. INTERNATIONAL HARVESTER CO., of Chicago, Ill., U.S.A. **2,912,811.** 9th January 1958; 17th November 1959.

* * *

Quick acting control valve for water-driven centrifugal machine. J. HERTRICH, assr. THE WESTERN STATES MACHINE COMPANY, of Hamilton, Ohio, U.S.A. **2,914,079.** 6th April 1954; 24th November 1959.—The valve 117 is used to control the water feed to



the turbine of a sugar centrifugal. The flow is interrupted when the conical piston 122*b* is thrust against the seating 121*a* under the action of the spring 131 and the water pressure itself, transmitted to the chamber 127 behind the piston by way of port 135, pilot valve 129 and port 136. The pilot valve too has a cone and socket valve mechanism 144*a* actuated by shaft 141 attached to diaphragm 137. When air-pressure is supplied through pipe 160 to the chamber 139 on one side of this diaphragm, the cone 144*a* closes the pilot valve, pressure in chamber 127 bleeds away through pipe 155 and piston 122 rises permitting the flow of water through the valve 117. When the air supply is shut off the cone 144*a* is returned by spring 138 causing an equalization of fluid pressures in either side of the piston 122 whereupon the spring action closes the cone 122*b* to seat 121*a*.

* * *

Extracting sugar from (beet) molasses. G. BATTISTONI of Milan, Italy. **2,916,404.** 2nd December 1955; 8th December 1959.—Prior to extracting sugar from molasses by the barium saccharate process, it is treated with stoichiometric proportions of alkali carbonate and caustic alkali, whereby to precipitate all the insoluble carbonates of metals present in the original molasses. The precipitate is separated and the purified molasses treated with BaO to recover its sucrose content. On recovery of the latter by precipitation of the Ba as barium carbonate, a pure precipitate is obtained which may be calcined to BaO and returned to process, either as the oxide, hydroxide or as a solution in saccharate mother liquor.

* * *

Purification of diffusion juice. H. I. WATERMAN, assr. N.V. CENTRALE SUIKER MIJ., of Amsterdam, Holland. **2,917,417.** 26th March 1954; 15th December 1959.—Diffusion juice, obtained by treating beet cossettes at a temperature of 35–40°C with water containing 0·2–0·3% on beet of SO_2, is treated at 15–70°C, by progressive addition of 0·2–0·35% CaO on beet (0·35% on beet), filtered, carbonated, and refiltered. The purification is achieved by progressive fractional counter-current addition of lime.

* * *

Thrower for sugar. S. W. LUCAS, of Plumpton, N.S.W., Australia. **2,920,746.** 15th July 1957; 12th January 1960.—See U.K.P. 825,113[1].

* * *

Beet harvester. T. DANIELSSON, assr. AB. OVERUMS BRUK, of Overum, Sweden. **2,921,637.** 2nd November 1956; 19th January 1960.

* * *

Beet topper. E. C. ROLLINS, of Ogden, Utah, U.S.A. **2,922,267.** 18th April 1957; 26th January 1960.

* * *

Purification of beet juice by means of ion exchange resins. H. SHIMIZU, A. MIYAHARA, S. OIKAWA and O. NASU. **2,926,110.** 18th July 1958; 23rd February 1960.—Beet juice, pretreated, e.g., by carbonatation, is passed through two resin columns, the first containing a mixture of a hydrogen-type weakly acidic cation exchanger and a hydroxyl-type weakly or medium-basic anion exchanger. The effluent is passed through the second column which contains a mixture of a hydrogen-type weakly acidic cation exchanger and a strongly basic anion exchanger. The effluent is desalted and decolorized. For regeneration, fresh caustic alkali solution is passed upflow through the second column, giving an outflow which may be used again for the second column and then as regenerant for the first column after addition of fresh caustic alkali solution.

* * *

Hydroxypropylation of hydroxy compounds (sucrose). A. W. ANDERSON, assr. DOW CHEMICAL CO., of Midland, Mich., U.S.A. **2,927,918.** 24th December 1956; 8th March 1960.—Propylene oxide is reacted with a polyol (sucrose) in the presence of a catalytic amount of a trialkylamine the alkyl groups of which have 2–3 carbon atoms (triethylamine or tripropylamine) whereby each hydroxyl group is etherified with a 2-hydroxypropyl group.[2]

[1] *I.S.J.*, 1960, **62**, 77.
[2] See also U.S.P. 2,908,681; *I.S.J.*, 1960, **62**, 111.

TRADE NOTICES

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Automatic Weighing Control. Elcontrol Ltd., Wilbury Way, Hitchin, Herts.

The equipment involves the use of one, two or three load cells on which the load, e.g., hopper, conveyor section, truck or loading platform, is supported. Alternatively the load may be suspended from up to three suspension-type load cells. The cells are connected to a remote relay unit which integrates their output giving a current which is monitored and, when it reaches a value corresponding to the selected operating weight, causes operation of a relay in the control unit, so actuating the control mechanism, e.g. conveyor motor, chute gate, automatic valve, diversion plough, etc. The equipment is suitable for a range of 50 lb up to a thousand tons or more and is provided with operating adjustment over any desired weight range. It gives repetitive accuracy of better than 1%.

* * *

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The pocket microscope illustrated is provided with optically worked lenses and has a magnifying power of from 20× up to 40×. Its circle of field is approximately ½ inch and it includes a mirror in the base

which reflects light onto the subject to be examined. Correct focusing is achieved by means of the knurled ring.

* * *

PUBLICATIONS RECEIVED

CROFTS "POWERGRIP" TIMING BELT DRIVES. Crofts (Engineers) Ltd., Thornbury, Bradford 3, Yorkshire.

Power up to 64 h.p. may be transmitted at up to 6000 r.p.m. by means of the drives described in publication 359. Crofts patent "Flush-Bushes" are fitted in pulleys to carry the shafts, and the pulleys are then connected by means of the U.S. Rubber Company's belts with internal neoprene teeth. Tables are presented giving h.p. ratings, centre distances, pulley data, etc.

* * *

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* * *

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A new folder, No. 2721, describes and provides dimensional data on "Jetslingers," machines equipped with short, high-speed belt conveyors for hurling free-flowing bulk materials into areas inaccessible by other mechanical means. The folder describes and illustrates suspended, swivelling and wheel-mounted units which, with belt widths of 14, 20 and 28 inches have capacities up to 700 tons per hour of materials weighing 50 lb/cu. ft.

* * *

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Cuban Sugar Exports 1959[1]

(Spanish long tons, raw value)

Destination	*Refined Sugar*	*Raw Sugar*	1959 *Total*	1958 *Total*
United States ..	305,574	2,510,843	2,816,417	3,102,565
U.S. for animal feed but not charged to U.S. quota ..	14,561*	7,226	21,787	25,560
U.S. for refining and re-export	7,715	21,255	28,970	42,084
EUROPE:				
Austria	—	—	—	7,698
Belgium	—	47,727	47,727	16,560
Eire	—	3,013	3,013	32,577
France	—	134,779	134,779	60,031
Greece	32,559	—	32,559	58,271
Holland	3,437	100,898	104,335	177,908
Hungary	—	—	—	10,903
Iceland	4,364	—	4,364	4,506
Italy	1,246	8,147	9,393	618
Malta	—	—	—	2,901
Portugal	94	—	94	99
Spain	—	—	—	66,569
Sweden	—	12,711	12,711	33,185
Switzerland	—	7,156	7,156	15,580
U.S.S.R.	—	265,700	265,700	182,146
United Kingdom	—	347,537	347,537	472,922
Vatican City ..	—	—	—	519
West Germany..	14,393	113,829	128,222	36,423
Yugoslavia	—	—	—	2,336
Total Europe ..	56,093	1,041,497	1,097,590	1,181,752
ASIA & OCEANIA:				
Cambodia	5,817	—	5,817	—
Ceylon	—	10,038	10,038	36,603
China	—	—	—	48,604
Hong Kong ..	—	9,857	9,857	7,679
Iran	—	9,228	9,228	9,894
Iraq	—	5,836	5,836	17,497
Israel	21,766	—	21,766	19,714
Japan	347	338,671	339,018	539,927
Korea	—	15,279	15,279	4,917
Lebanon	—	24,363	24,363	8,605
Syria	—	28,459	28,459	37,234
Tahiti	—	—	—	194
Vietnam.....	—	25,711	25,711	23,319
Total Asia & Oceania	27,930	467,442	495,372	754,187
AFRICA:				
Libya	2,726	—	2,726	—
Morocco	1,773	192,899	194,672	151,618
Tunisia	—	—	—	5,452
Total Africa	4,499	192,899	197,398	157,070
AMERICAS:				
Bermuda	626	—	626	235
Canada	—	90,072	90,072	184,539
Chile	3,478	—	3,478	4,110
Colombia	5,239	—	5,239	27,080
Dutch West Indies	2,084	89	2,173	1,554
Honduras	94	—	94	942
St. Pierre & Miquelon ..	127	—	127	145
Venezuela	—	63,050	63,050	8,085
Total Americas..	11,648	153,211	164,859	226,690
GRAND TOTAL ..	428,020	4,394,373	4,822,393	5,489,908

* Includes 4357 tons Turbinado sugar.

BREVITIES

The late G. B. Williamson.—GEORGE WILLIAMSON, best known as the inventor of the clarification technique using lime, phosphoric acid and air flotation of impurities, died in New Orleans in December last. Up till his retirement he had been Superintendent of Reserve refinery in Louisiana.

* * *

South Vietnam sugar factory plans.[2]—A group of Japanese sugar experts have visited Saigon to examine the possibility of erecting a sugar factory in Central Vietnam, to be run by a Japanese-Vietnamese company, and having a capacity of 100 tons of refined sugar per day.

* * *

Volcano damage in Hawaii[3].—Olaa Sugar Co.'s start was postponed by two weeks to the 15th February following the eruption of the Puna volcano which has affected its cane, covering 430 acres of the 1960 crop with lava and with cinders ranging from 16 to 30 inches deep. Sugar lost has not been estimated but the area usually produces about 9 tons of sugar per acre. Some 100 acres of the 1961 crop have been destroyed while another 200 acres are covered with cinders 5–7 inches deep.

* * *

Cuban crop increase[4].—An increase of 200,000 Spanish tons in the 1959/60 Cuban crop has been announced. It is thought that the additional tonnage is needed to take the place of certain stocks which have been destroyed and also to provide an adequate carry-over to meet export requirements in the first weeks of 1961. Any decision to increase the permitted tonnage could hardly have been delayed much longer as the first mills are already closing.

* * *

New factory for the Sudan[5].—The first sugar factory in the Sudan is to be erected with West German assistance. The annual capacity of the new plant will reach 55,000 tons of sugar and so cover half the domestic requirement. The costs for erection will amount to about DM 65 million. The factory, which will also have an attached refinery, is to be supplied by Buckau R. Wolf A.G. and Braunschweigische Maschinenbauanstalt, and will be located at Hassahisa, between Khartoum and Wad Medani.

* * *

The late K. V. H. Hampel.—It is with regret that we record the death on 10th February of KARL HAMPEL, Deputy Chief Technical Officer (Engineering) of the British Sugar Corporation. He was born in 1898 and obtained his engineering degree at Brno University. After gaining experience in Austrian sugar factories, he assisted in 1926 with the erection of Carlow factory of the Irish Sugar Company. In 1927 he helped to erect Allscott factory in Shropshire, subsequently becoming manager. Mr. HAMPEL went to Peterborough in 1945 on appointment as Chief Engineer, becoming D.C.T.O. (Engineering) two years later.

* * *

Dehydrated cane juice feed for animals[6].—An account is given in a Cuban journal of a new process which has undergone semi-industrial scale trials at Central Mabay, Oriente, whereby cane juice is neutralized with lime to prevent inversion and concentrated under vacuum to 85°Brix. It is then treated with 2% of yucca starch and the vacuum broken, followed by reheating until it reaches a temperature of 135°C. Once this temperature is reached the viscous mass is emptied into slightly modified crystallizers and there beaten and agitated until a dry granular product is formed. It is cooled and filled into water-proofed paper sacks. The equipment necessary includes all the usual plant for a sugar factory, except for the clarification equipment and the centrifugals. The product which contains the original mineral and vitamin constituents of the juice is very suitable as an ingredient in animal feeds.

---

[1] *Lamborn*, 1960, **38**, 60.
[2] F. O. LICHT, *International Sugar Report*, 1960, **92**, (Supp. 4), 54.
[3] *Willett & Gray*, 1960, **84**, 60.
[4] C. Czarnikow Ltd., *Sugar Review*, 1960, (451), 68.
[5] F. O. LICHT, *International Sugar Report*, 1960, **92**, (Supp. 5), 65; (3), 26.
[6] *Cuba Económica y Financiera*, 1960, **35**, (406), 13.

BREVITIES

Indian-built sugar factories[1].—The four plants being built by Indian consortia[2] are expected to be completed for operation by January 1961. The cost of one complete plant of 1000–1250 tons capacity will be about Rs. 8·4m. The factories are to be erected at Chodavaram, Dist. Visakapatnam, Andhra Pradesh; Amadalavalasa, Dist. Srikakulam, Andhra Pradesh; Karad, Dist. North Satara, Bombay; and Sankeshwar, Dist. Belgaum, Mysore.

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New Indian cane planter[3].—The Indian Institute of Sugarcane Research, Lucknow, has designed and developed a cane planter consisting of a fore-carriage with a seat for an operator and two seed boxes. A trailer ridger makes the furrows and is attached to the fore-carriage. It is fitted with a fertilizer distributor and a chute for dropping the setts into the furrows. Using the planter, two men with a pair of bullocks can plant two acres in eight hours; currently, it takes 24 men with a pair of bullock to plant 2½ acres in the same time.

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Sugar production in Réunion, 1959[4].—Production of the island of Réunion, for the campaign ended November 1959, increased to 200,326 tons, refined value. This is 17·7% higher than the previous season when production was 164,735 tons of raw sugar, or 158,143·6 tons, refined value. The yield of sugar % cane increased from 11·10 in 1958 to 11·54, while the cane crushed totalled 1,735,180 tons, harvested from about 30,000 hectares. Production of molasses was increased to 50,850 tons; it is used principally for rum and alcohol manufacture.

Stock Exchange Quotations

CLOSING MIDDLE

London Stocks (*at 20th April*, 1960)	
Anglo-Ceylon (5s)	18/–
Antigua Sugar Factory (£1)	15/–
Booker Bros. (10s)	32/3
British Sugar Corp. Ltd. (£1)	24/–
Caroni Ord. (2s)	4/3
Caroni 6% Cum. Pref. (£1)	17/6
Distillers Co. Ltd. (6s. 8d. units)	36/–
Gledhow Chaka's Kraal (£1)	57/6
Hulett & Sons (£1)	65/–
Jamaica Sugar Estates Ltd. (5s units)	8/3
Leach's Argentine (10s units)	15/–
Reynolds Bros. (£1)	46/3
St. Kitts (London) Ltd. (£1)	18/6
Ste. Madeleine (Ord.) (£1)	29/–
Sena Sugar Estates Ltd. (10s)	17/6
Tate & Lyle Ltd. (£1)	58/3
Tate & Lyle Investments Ltd. (5s)	12/1½
Trinidad Sugar (5s stock units)	30/–
United Molasses (10s stock units)	41/6
West Indies Sugar Co. Ltd. (£1)	18/6

CLOSING MIDDLE

New York Stocks (*at 19th April*, 1960)	$
American Crystal ($10)	37½
Amer. Sugar Ref. Co. ($100)	26⅝
Central Aguirre ($5)	22½
Cuban American ($10)	15¾
Great Western Sugar Co.	26¾
South P.R. Sugar Co.	16
United Fruit Co.	23

U.S.S.R. sugar expansion[5].—The sugar production of the Kuban area of Krasnodar Territory, R.S.F.S.R., was 59,000 tons in 1956 and 88,000 tons in 1958. In 1959 it was raised to 224,000 tons and is to be 550,000 tons in 1960. Output is to be increased to one million tons in 1965. Sugar beet areas have been expanded accordingly and in addition to the two old factories, ten new ones were put into operation last year. A further three factories were to be completed in February or March 1960, while another three are in course of construction at Labinsk, Dinsk and Kurgannaya. A new sugar factory is also being built in the district of Stovropol near the Erker-Shakhar railway line[6].

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Sugar Stamp.—Illustrated is a new 30 f. stamp issued for airmail by the new Malagasy Republic (Madagascar), which depicts in-field rail transport of cut cane.

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Dominican Republic crop limitation[7].—A decreed limit of 917,200 metric tons has been set on sugar production, including 65,741 tons raw sugar for the U.S., 8165 tons refined sugar for the U.S., 3294 tons as liquid sugar for the U.S., 655,000 tons world basic quota, 85,000 tons local consumption and 100,000 tons special reserves. The tonnages set aside for the U.S. and free world market are those permitted under the U.S. Sugar Act and the International Sugar Agreement. The latter, however, has been reduced by 15% although the Dominican Republic may be expected to share in the redistribution of shortfalls later in the year.

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"Telecontrolled" sugar factory for the U.S.S.R.[9]—According to the East German agency ADN, a sugar factory is being built near the village of Krievz, near Kursk, where sugar production will be entirely automatic under the guidance of an engineer aided by five television cameras. Construction of four similar factories is projected.

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[6] *ibid.*, (Supp. 5), 60.
[7] *ibid.*, (Supp. 4), 50.
[8] *La Industria Azuc.*, 1960, **65**, 7, 32–33.
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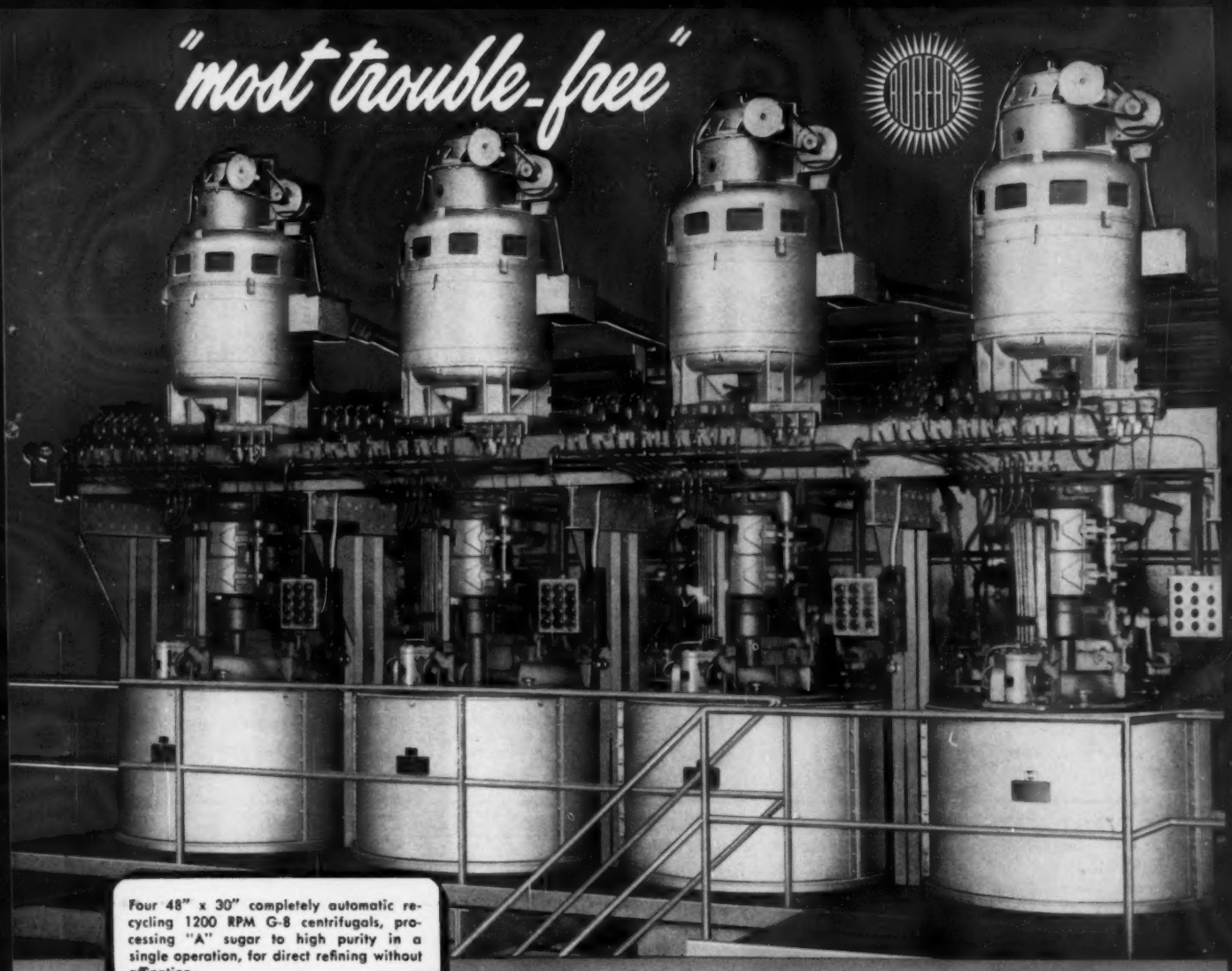

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Index to Advertisers

	PAGE
A.P.V. Co. Ltd.	xxvi
Ashworth & Parker Ltd.	xxxv
Bellingham & Stanley Ltd.	xxxix
Belliss & Morcom Ltd.	xlv
Blairs Ltd.	xvii, xxviii
Thomas Broadbent & Sons Ltd	i
Broussard Machine Co.	xxxix
Buell Ltd.	ii
Büttner-Werke A.G.	xxv
Cary Iron Works	xliv
Clydesdale Chemical Co. Ltd.	xxxix
Cocksedge & Co. Ltd.	xxvii
George Cohen, Son & Co. Ltd.	xxxv
A. F. Craig & Co. Ltd.	xii
Crofts (Engineers) Ltd.	xxii
Crone & Taylor (Engineering) Ltd.	xxxvi
Dorr-Oliver Inc	Inside Back Cover
Dunford & Elliott Process Engineering Ltd.	ix
Ewart Chainbelt Co. Ltd.	xxxviii
Extraction Continue De Smet S.A.	xxxiii
Fisons Pest Control Ltd.	xv
Soc. Fives Lille—Cail	viii
George Fletcher & Co. Ltd.	xx, Outside Back Cover
Fontaine & Co	xxxviii
Goka N.V.	xliv
Hein, Lehmann & Co. A.G.	xxx
N. A. Helmer	xxxviii
Fr. Hesser Maschinenfabrik A.G.	vi
Robert Hudson Ltd	xl
Hudson & Wright Ltd.	xxix
Johns-Manville International Corp.	xxxii
Lepage, Urbain & Cie	xxiv
John McNeil & Co. Ltd.	xvi
E. C. Masson	xxxviii
Mirrlees Watson Co. Ltd.	Inside Front Cover, iii
New Conveyor Co. Ltd.	v
Nordiska Maskinfilt AB.	xli
Owl Engineering Supplies Ltd.	xl
Pennine Chainbelt Co. Ltd.	xxxvi
Pott, Cassels & Williamson Ltd.	xxi
Power Plant Co. Ltd.	xli
Sack Filling & Sewing Machine Syndicate	iv
Saunders Valve Co. Ltd.	xlii
Richard Simon & Sons Ltd.	xlii
A. & W. Smith & Co. Ltd.	xviii, xix
Duncan Stewart & Co. Ltd.	xxiii
Stork-Werkspoor N.V. (V.M.F.)	vii
Suchar Sales Corporation	xxxi
Sugar Manufacturers' Supply Co. Ltd.	xi
AB. Svenska Kullagerfabriken	xxxiv
Technoexport, Czechoslovakia	x
Watson Laidlaw & Co. Ltd.	xiv
Western States Machine Co.	xxxvii
Joseph Westwood & Sons Ltd.	xliv

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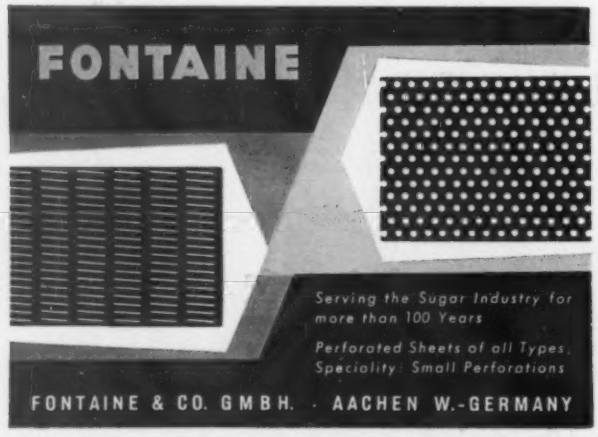
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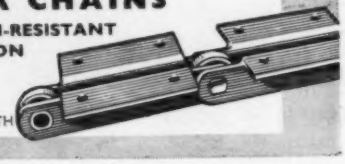

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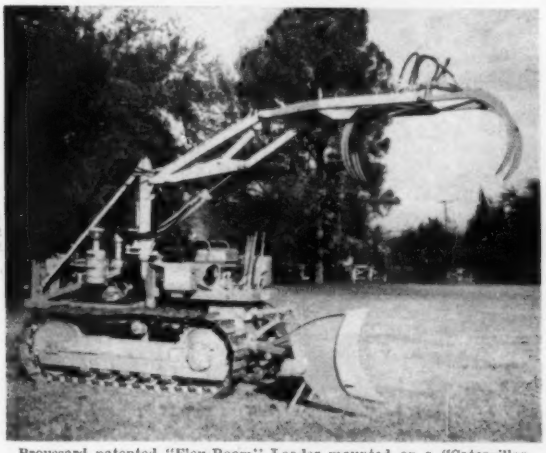

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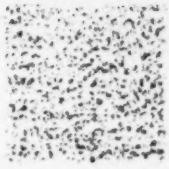

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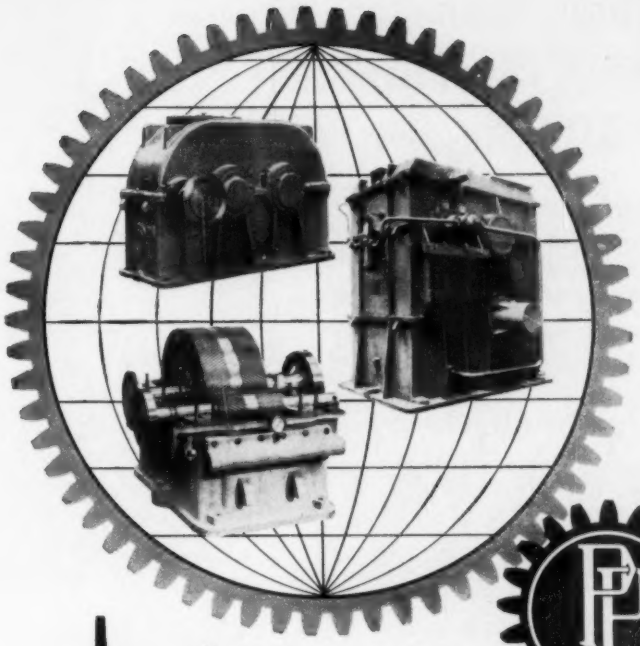

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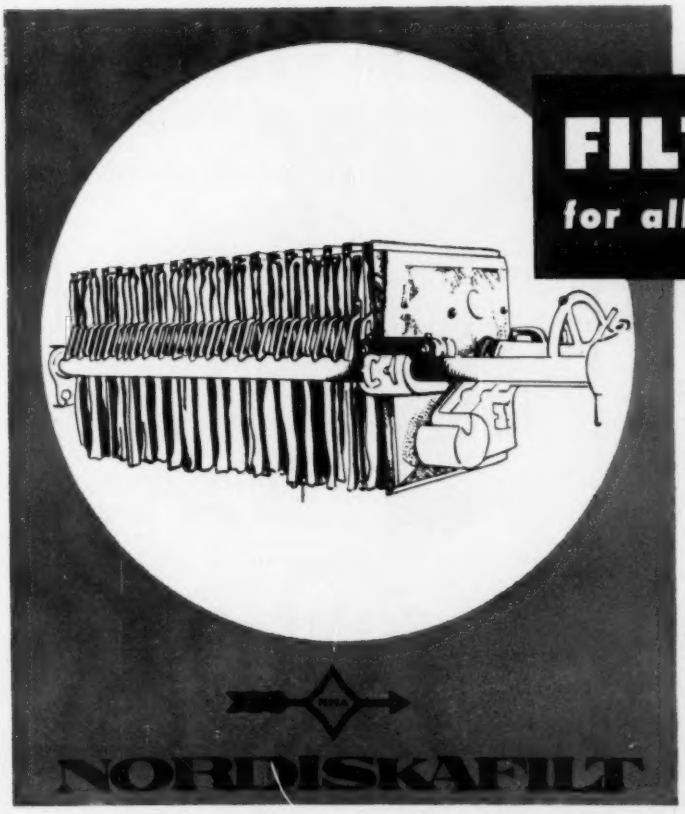

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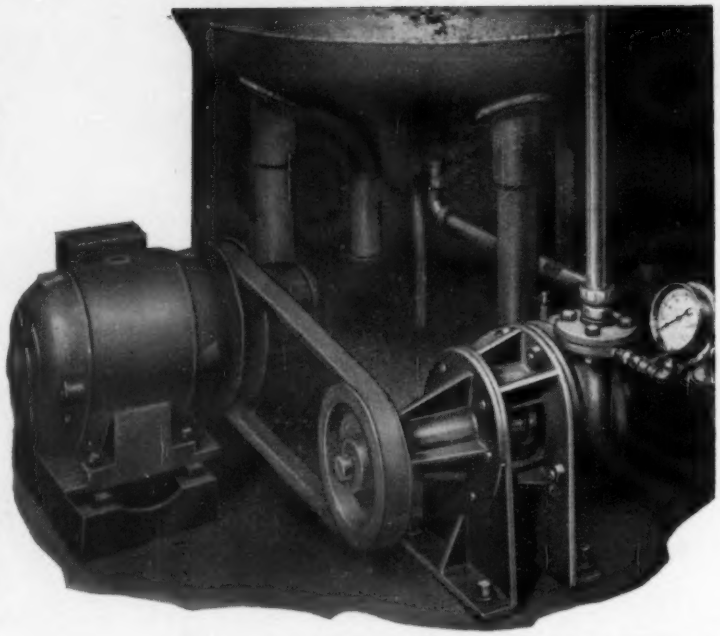

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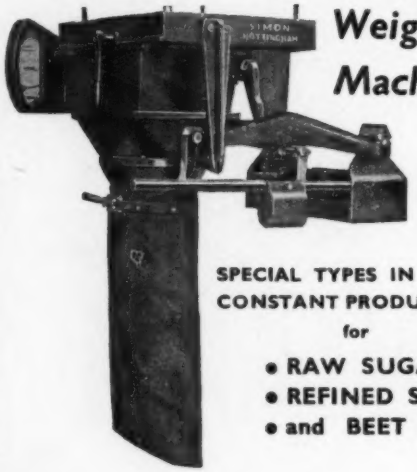

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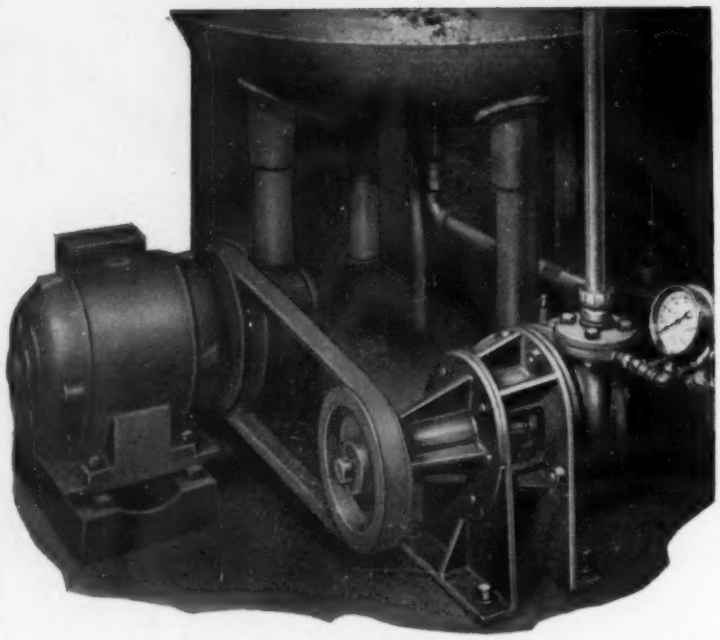

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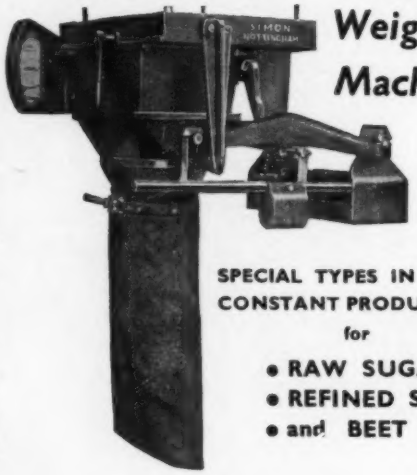

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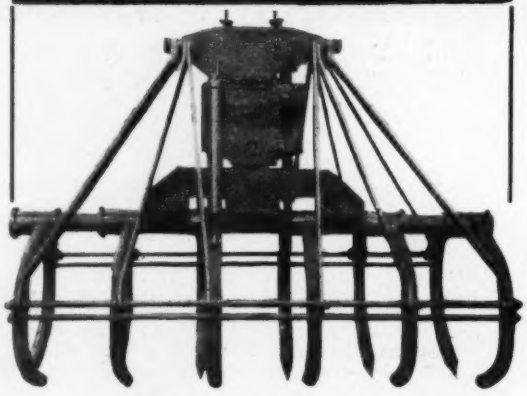

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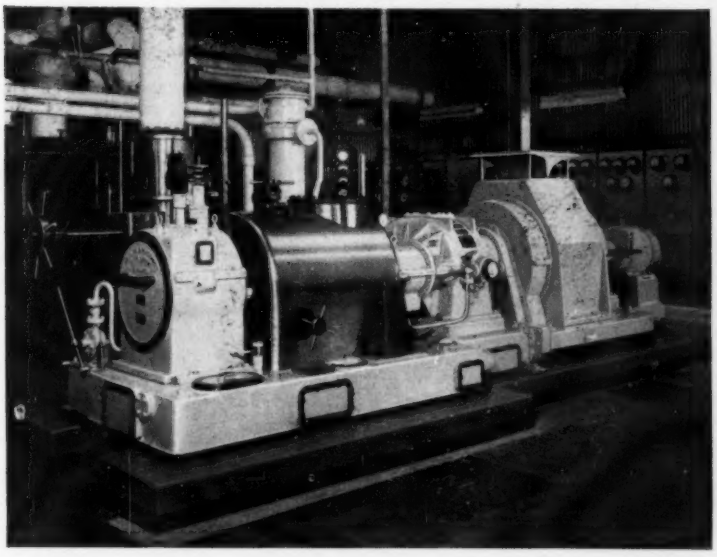

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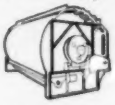
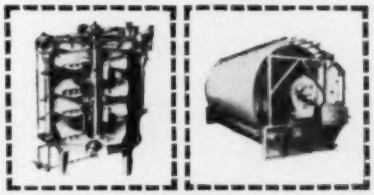
UBOMBO RANCHES, SWAZILAND, INSTALLS 1 RAPIDORR CLARIFIER AND  2 OLIVER-CAMPBELL FILTERS, FURNISHED BY DORR-OLIVER COMPANY, LTD., ENGLAND. DESIGN AND ENGINEERING: A. & W. SMITH, LONDON AND GLASGOW



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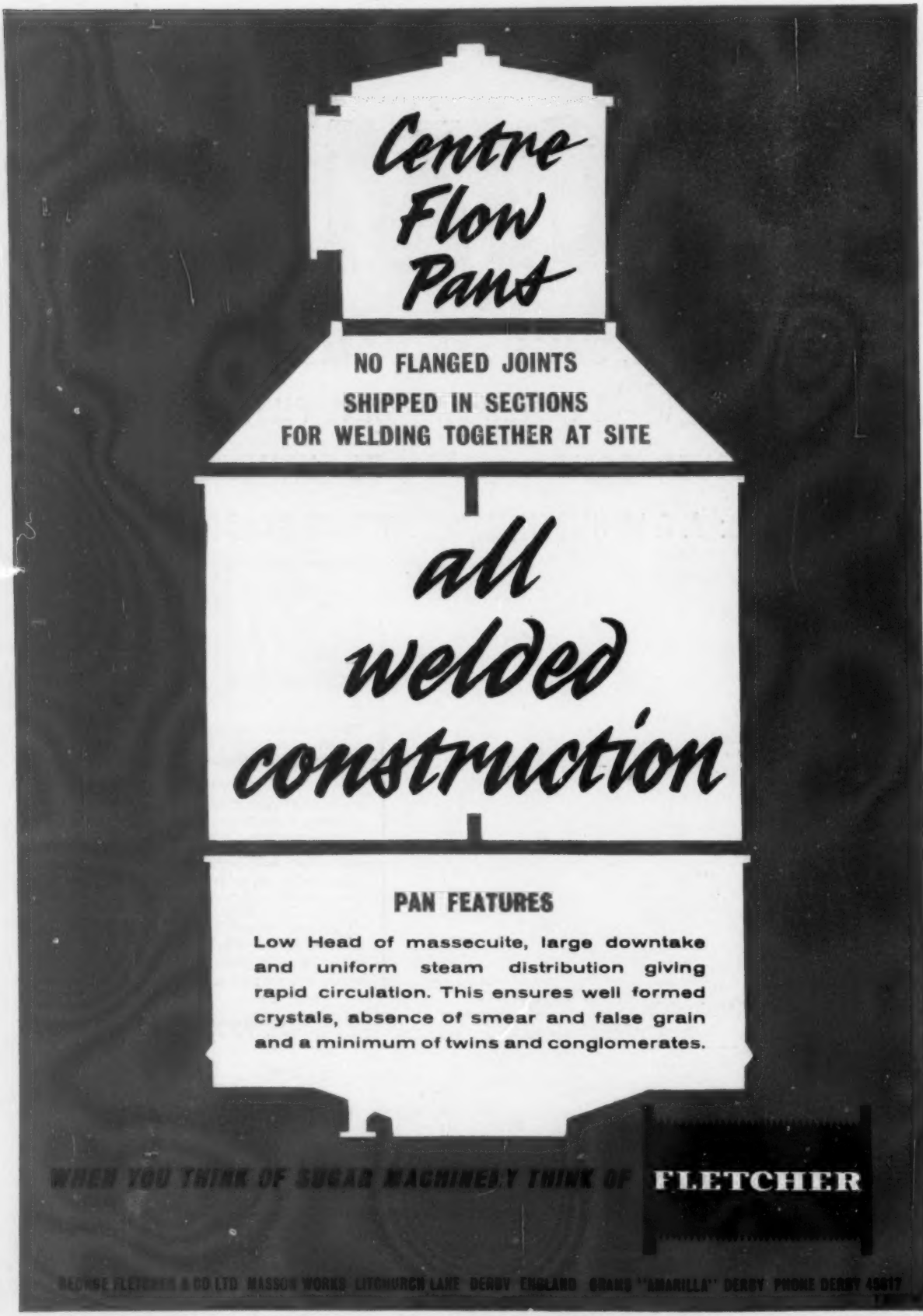
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